Chemical & Engineering NEWS

CALENDAR OF EVENTS
Scientific meetings in 1993
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WORLD CHEMICAL OUTLOOK

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Chemical & Engineering NEWS

Cover: Aromatics expansion completed this year by Badger Ltd. of London (part of Badger of the U.S.) for Petrogal at Porto, Portugal

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Slump hit major solvents hard this year

Acetone and methylene chloride production may recover a bit in 1983, but synthetic ethanol may be hurt even more by competition

Bruce F. Greek
C&EN, Houston

U.S. solvents producers never had illusions about 1982, but the results were much worse than expected. Looking generally for flat to slightly falling production this year, producers of the three major solvents—acetone, ethanol, and methylene chloride—detailed in the following pages, now find combined output down 15% from 1981 and 28% from the peak year of 1979.

The outlook finally seems to be changing for the better. Production may turn up 5 to 10% in 1983 for acetone and methylene chloride. However, that still will not match 1981's output, let alone 1979's. Pessimists hold sway for synthetic ethanol, forecasting 1983 production even lower than in 1982 because of its problems of competing with fermentation ethanol.

Doubt clouds all of these forecasts. Industry sources are dubious, for example, that their earlier forecasts for 1983 production will be met, now that 1983 is getting close. 1984 now is widely regarded as the year in which acetone and methylene chloride production will again equal output in 1981.

Ethanol's fortunes could continue to diverge from the others. Competition from fermentation ethanol, either made in the U.S. or imported, could lengthen synthetic ethanol's downtrend for years ahead. A possible break in the trend could occur if economic recovery in the U.S. proves more robust than now forecast.

The ethanol competition continues to be complicated by a background interplay of raw material hydrocarbon and grain costs. If real costs of grain, mostly corn, and other sources of fermentation ethanol keep heading down, then synthetic ethanol will become slowly less competitive as feedstock ethylene prices hold or rise. The underlying force on ethylene is that its own raw material light hydrocarbon prices are holding or rising with the slow deregulation of natural gas.

Unless unusual weather plays a role, corn prices are not expected to rise much for at least the next year because of surpluses on the farm. Hence, fermentation ethanol likely will have less raw material cost pressure than will synthetic ethanol. The tax incentives for use of fermentation ethanol in its main intended market in fuels also could decline, putting pressure on producers to sell it wherever they can. The alternative is largely industrial solvent uses, one of the main preserves of synthetic ethanol.

The other two solvents in this group have the same hydrocarbon cost pressures as does synthetic ethanol. This pressure includes the large energy cost increases in making constituent chlorine. Such cost pressures in the U.S. are likely to continue even though world prices for crude oil may slip for some time to come.

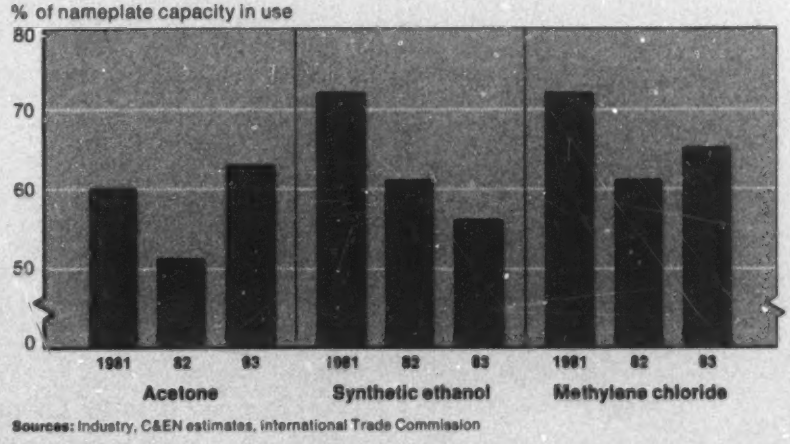
In addition to bringing cost pressures from raw materials and energy, the decline in solvents demand hurts producers' plant efficiencies and incomes. In 1982, sales value of these three major solvents will total about $950 million, down 14% from $1.1 billion in 1981.

If inflation were taken out of the data, producers of these solvents would find 1982 sales are down even more from 1981. Volume and price increases expected during 1983 would bring up the current-dollar sales for acetone and methylene chloride but probably not for synthetic ethanol. This trend could continue further in the 1980s: Inflation-adjusted sales could do little more than stand still. If, as widely forecast, imports begin to take a share of the U.S. market and exports dry up, sales could decline in both real and current dollars.

This uninviting prospect suggests an accompanying decline in plant capacity. Eventually, according to industry sources, solvents most likely will get the same capacity-cutting combination now occurring in other chemicals—long-term idling of some units and actual scrappage of others. However, unless some unusual tax incentives come along, such as faster depreciation on new units, sources suggest that outright scrappage will be low even with very low operating rates. Unused plants simply will be allowed to sit. Then the question of how much of total capacity is really operable will become much more difficult, even for producers.

Key Chemicals

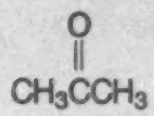
Even with some upticks, plant use will stay low in 1983



Sources: Industry, C&EN estimates, International Trade Commission

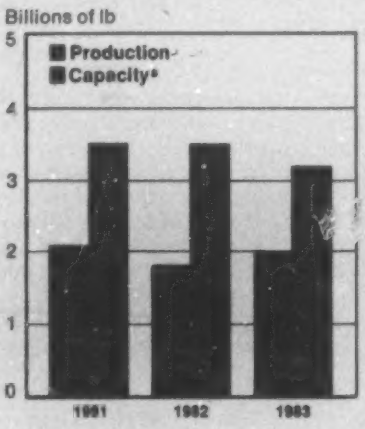
Key Chemicals

Acetone



- ***Demand down***
- ***Capacity reduced***
- ***Prices discounted***

PRODUCTION/CAPACITY



[a] First quarter.

HOW MADE

Coproduction with phenol by oxidation of cumene; dehydrogenation of 2-propanol

MAJOR DERIVATIVES (U.S.)

Methyl and other methacrylates 30%, methyl isobutyl ketone 10%

MAJOR END USES (U.S.)

Solvents, alone or as derivatives 60%; fabricated plastics 30%

FOREIGN TRADE

Exports—declining to about 125 million lb in 1982; imports—negligible

PRICES

List price 29 to 31 cents a lb; discounting widespread

COMMERCIAL VALUE

$500 million for production, 1982

Acetone dissolved into recession this year even worse than producers feared. The product's strong ties to consumer demand—and hence to the ups and downs of business cycles—come through its use as a solvent for coatings and as an ingredient of acrylic polymers. Assuming a slow recovery from the recession in 1983, the outlook for this material similarly is a small bounce. As might be expected, a return to 1979's peak production levels will take at least until 1984.

Acetone is both coproduced with phenol and made independently from 2-propanol. As a coproduct, acetone production depends strongly on demand for phenol. And phenol, whose major use is in adhesives for plywood, has been shaken badly by the decline in housing production.

Even so, demand for phenol apparently has held up better than for acetone. Telling evidence of surplus acetone comes from list-price cuts following earlier temporary voluntary allowances and from temporary shutdown of some of the 2-propanol-based units. Acetone pricing remains fragile, and discounting continues even after the list price decline.

Both U.S. and export demand for acetone have declined in 1982, leading to an overall production slump of about 15% to about 1.8 billion lb from over more than 2.1 billion lb in 1981. Some inventory cutting also has occurred this year, so consumption might turn out to be a bit higher than production as in a great many other commodity chemicals.

This inventory cutting could be a blessing, say some industry sources, if it spurs production ahead of demand in 1983. For this reason, plus an expected general recovery in acetone uses as the economy improves, a production rebound of about 10% to 2 billion lb or so seems likely in 1983.

Plant capacity for acetone has dropped in 1982. The main influence was Allied's decision not to rebuild completely the capacity at Frankford, Pa., damaged by fire last spring. The resulting capacity decline is not quite 10% of the former industrywide total. This plant is one of the coproduct operations making acetone and phenol from cumene. Partly offsetting this capacity loss has been startup of new phenol-acetone capacity at General Electric in Mt. Vernon, Ind.

Nameplate capacity for acetone now totals about 3.2 billion lb a year. So if 1982 production comes to the consensus level of 1.8 billion lb, the average operating rate will be a very poor 56%.

However, considerable capacity currently is shut down. Some of this capacity is cumene-based, but more of it is based on 2-propanol. Given the relative rise in value of propylene compared to other hydrocarbon raw materials, 2-propanol-based acetone must have difficulty competing with cumene-based acetone. It doesn't help matters that cumene-based acetone is forced on the market by phenol demand.

Estimates of shut-down capacity vary from 10 to 20% of the nameplate total or 300 million to 600 million lb per year. If, say, 500 million lb of acetone capacity do not operate at all this year, the remaining plants then have run at an average rate of 67%—still not good, but closer to plant-use levels in other commodity chemicals.

Whether producers restart these shut-down plants depends on the nature of any recovery in 1983. Current thinking has solvent markets for acetone swinging up a bit faster next year than will the housing markets for phenol. Hence, to meet solvent demand, more of the "on purpose" acetone will be needed via 2-propanol.

Acetone's chemical uses, the most important being methyl methacrylate, are expected to recover a bit faster than will the general economy because most of these uses sport predicted growth rates higher than for gross national product. But these chemical outlets possibly may not push up as fast as will the solvent markets. Chemical uses are generally well established, with trends changing more slowly than in the more volatile solvents. Solvents go into many small-volume areas, some of which grow and die rapidly.

For 1983 then, acetone will not fully recover from its sharp 1982 decline. And after several years below previous production highs, the likelihood grows that some small, currently shut-down plants will be scrapped.

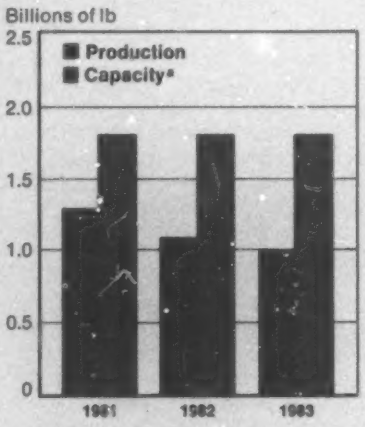
Key Chemicals

Ethanol

CH_3CH_2OH

- ***Demand down***
- ***Capacity cut possible***
- ***Prices soft***

PRODUCTION/CAPACITY



[a] Synthetic only as of first quarter.

HOW MADE

Hydration of ethylene

MAJOR DERIVATIVES (U.S.)

Acetic acid (vinegar) 10%, esters 10%, ethers 5%

MAJOR END USES

Solvents 55% (85% including derivatives), food 10%

FOREIGN TRADE

Exports—holding at 60 million lb in 1982; imports—may reach 175 million lb, including some fermentation ethanol

PRICES

List prices $1.85 to $1.97 per gal; discounting widespread

COMMERCIAL VALUE

$325 million for production, 1982

Synthetic ethanol's private recession in the U.S. probably will keep right on going in 1983. Whether this commodity's difficulties eventually will become as bad as those of fermentation ethanol 25 to 30 years ago, when it was almost wiped out by synthetic ethanol, no one yet predicts.

But it is clear that production of synthetic ethanol has continued to drop in 1982, descending perhaps more than 15% from 1981 to 1.1 billion lb. In 1983, industry sources forecast another drop to about 1.0 billion lb. Later on, production could level off, but a pack of uncertainties makes any such forecast shaky.

Plant capacity for synthetic ethanol continues to hold at about 1.8 billion lb a year. Of this nameplate total, a bit more than 20% is shut down, with prospects of restarting iffy. In addition, something less than 10% of total capacity goes largely to captive uses.

The remaining two thirds of capacity, some 1.2 billion lb or a bit more, supplies the merchant market. The merchant plants are running at relatively high rates among big-volume chemicals. For plants actually operating, 1982 production of 1.1 billion lb means a current operating rate possibly close to 80%. On paper, of course, the use rate drops to just over 60% of all available capacity, including units that are shut down.

The same problems, only worse, that prompted the decline in production of synthetic ethanol in 1982 are likely to stick around in 1983—the slump in the economy and slow market inroads by fermentation ethanol. Solvent uses of ethanol are so diverse that in general they follow the overall economy. Since these product chains eventually reach consumer goods such as cosmetics and toiletries, a recession such as in 1982 is a big blow.

Fermentation ethanol's influence on synthetic ethanol is complex and growing. Until quite recently, the general high quality and uniformity of synthetic ethanol gave it control of markets that fermentation products couldn't touch. However, recent improvements in the quality of some fermentation ethanol have gained producers the nod from some formerly uninterested customers.

Even with the added costs of quality improvement, fermentation ethanol still can sell below list prices for synthetic ethanol. As a result, pricing of ethanol has become chaotic, according to industry observers. Prices cover quite a range in different parts of the country, depending on real or apparent influences of fermentation material. Reported discounts vary from a cent or two per gallon to 10% or more.

This overhang of fermentation ethanol depends on sharply varying conditions such as the current capacity excess in its primary market in fuels. Fuel uses such as gasohol, in turn, are influenced by economics. For example, states with some kind of tax exemption on ethanol for fuel use are taking another look, especially with a potential increase due in the federal fuel tax. Most states are short of revenue, and some have been forced to shift general funds to highway use because fuel taxes haven't kept up with highway costs.

Economics also will be influenced by possible imports of fermentation ethanol from countries with surpluses, such as Brazil. If imported ethanol were landed at a cost of $1.00 per gal, well below domestic selling prices, then U.S. producers of fermentation ethanol would increase their efforts to sell into the alternate industrial markets held by synthetic ethanol.

Methanol also enters the future fuels picture. It may gain a market as a substitute for ethanol in gasoline blends because its price is half or less. Any such development also could push more fermentation ethanol into synthetic markets. The size of the methanol fuel market is difficult to estimate, according to industry sources. But as long as overall methanol demand is weak, this interplay with ethanol in gasoline should be expected, even though there is concern about the damaging effect of methanol on engine parts.

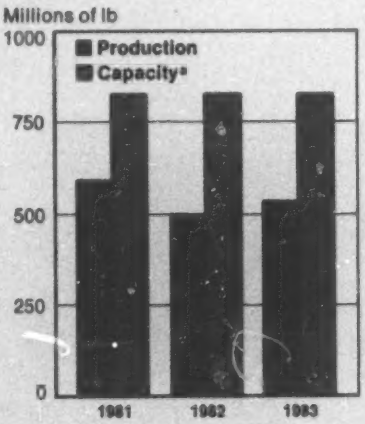
The prospects then in synthetic ethanol are for slow erosion of traditional markets, continuing effort by producers to stay ahead of fermentation ethanol in quality, and little change in the nonfuel use pattern. Fermentation ethanol producers won't have everything their way, either, with capacity ballooning, government subsidies possibly lowering, and imports looming as competition.

CH_2Cl_2

Methylene chloride

- ***Production down***
- ***Capacity excessive***
- ***Prices low***

PRODUCTION/CAPACITY



a First quarter maximum, varies with product mix.

HOW MADE

Chlorination of methane; hydrochlorination of methanol, then chlorination of methyl chloride

MAJOR DERIVATIVES

None of any size

MAJOR END USES (U.S.)

Paint remover 30%, aerosol propellants 20%, degreaser 10%

FOREIGN TRADE

Exports—about 40 million lb in 1982; Imports—about 30 million lb

PRICES

List price 26.5 cents a lb; discounting widespread

COMMERCIAL VALUE

$125 million for production 1982

Methylene chloride has properties that would seem to give it strong demand—high solvency, low toxicity, inflammability, and low corrosiveness. Unfortunately, 1982 has turned out to be another in a series of poor years.

Estimates of 1982 production of methylene chloride range more widely than for most other big-volume chemicals. Output is estimated anywhere from 480 million to 540 million lb, down 9 to 19% from the final International Trade Commission figure of 592 million lb in 1981.

Production is hard to pin down because of methylene chloride's diversity of uses and the interplay of chemical reactions involved in making several chlorinated methanes in the same plant. A good guess is that production of methylene chloride will be down 15% this year from 1981, close to 500 million lb after a poor fourth quarter.

Similarly, plant capacity for methylene chloride varies considerably because producers can change product mix of the four chlorinated methanes by changing process conditions. Since methylene chloride is second in the product slate, producers can recycle it to increase output of the heavier chloromethanes, chloroform and carbon tetrachloride, to meet market needs. Sources' estimate of 825 million lb for nameplate capacity probably is close to the maximum. A minimum capacity might be as low as 700 million lb.

Production of 500 million lb in 1982 would put plant use at about 60% of the maximum figure, down from more than 70% in 1981. Most likely, however, the real operating rate this year will be higher than 60% because of product mix decisions lowering actual capacity for methylene chloride.

This low operating rate has hurt prices, as expected. In a year's time, list prices have dropped more than 10% to 26.5 cents a lb from 30.5 cents. Producers cut prices to bring list quotes closer to actual selling levels. The gap has not fully closed, however, according to industry sources. Discounting still goes on, especially by sellers of imported material and U.S. producers who must compete with imports.

To some extent, low prices for raw material chlorine helped producers hang on to any profit margins earlier in the year. Now that chlorine prices have begun to rise, the squeeze is really on for methylene chloride. The chlorinated methanes might set price increases as 1983 begins because producers may have no other option except to close up. Variable costs, chiefly raw materials, in making methylene chloride and other chlorinated methanes make up 70 to 80% of total production costs, leaving little room for savings when raw materials prices increase.

Even with possible price hikes coming, methylene chloride is expected to rebound because it has a number of uses for which it is the best material for these costs. New uses develop occasionally, including substitution for other solvents. But neither such developments nor the recession in established markets is expected to change significantly the overall use pattern.

Some uses, such as aerosol propellants, are growing faster than others such as paint remover formulations, which have been hit by the recession. Industry sources are reluctant to predict the year, but most agree that aerosols will supplant paint removers as the largest use area. The shift away from aerosols containing fluorine atoms obviously helps methylene chloride.

Aerosols have another plus as an outlet for methylene chloride in that a few large packagers of aerosol products account for a substantial share of total demand, affording high-volume sales. In contrast, paint removers are more often formulated by small companies, who are supplied by chemical distributors. Distributors, in turn, are a large source of sales for primary producers of methylene chloride. Distributor competition tends to vary a lot with services desired by these small users, thereby often unduly influencing sales of methylene chloride.

Other sizable uses of methylene chloride such as degreasing are more industrially oriented and have been affected strongly by the recession. Recovery in demand here depends on the strength of recovery in the economy.

For 1983, the overall expectation is that methylene chloride should experience a modest recovery, 5 to 10% above 1982 production but still under 1981 production. Complete recovery will take longer.

Special Report

WORLD CHEMICAL OUTLOOK

The malaise that was widespread throughout the world's chemical economy a year ago has become pandemic as 1982 winds down. With demand sapped by global recession, production of chemicals has been cut back drastically across the industrialized world, and producers increasingly find themselves strapped financially.

In the U.S., output has been stumbling for the past two years. Plants are running far below capacity, and profitability is the skimpiest in recent memory.

Western European producers, also plagued by plant capacity, far in excess of any foreseeable demand, are desperately seeking ways to retrench, trim costs, and reduce their burdensome load of debt. In Japan, an industry that has lost its competitive edge likewise is looking for ways to slim down and consolidate its operations. And world trade in chemicals, after surging in the 1970s, is down for the second year.

Now that the business recovery many chemical producers confidently had looked for during the latter months of 1982 has proved to be a will-o'-the-wisp, hopes are riding on a revival sometime during the year ahead. But the current winter clearly will be bleak. And conclusive evidence that the worst is over has yet to appear.

United States	46	U.S.S.R./ Eastern Europe	63
Foreign Trade	50	Middle East	65
Western Europe	53	Mexico	66
Japan	58	Brazil	67
Canada	61		

Business will improve next year, but the recovery may be sluggish

UNITED STATES

Chemical producers look to higher consumer spending to revive their severely depressed production and profits

David M. Kiefer, C&EN Washington

Last year's consensus forecast for the chemical industry in 1982—that after several months of slack business, recovery clearly would be evident during the second half—may still prove accurate. It will, that is, if one reads the forecast to mean the second half of 1983, rather than that of 1982.

The second half obviously carries a considerable appeal for business analysts. Now, for the third year in a row, as they ponder the business outlook, they foresee operations gathering strength during the latter part of the year. Unfortunately, neither in 1981 nor this year did the second-half upturn actually materialize. And as analysts look across the valley of recession, they are finding the dimensions of upward slope on the other side wrapped in mists of uncertainty.

Production of chemicals and synthetic materials in the U.S. has been on a protracted toboggan ride for most of the past two years. Now it is at a level 14% lower than it was at the end of last winter and 25% below its prerecession peak at the start of 1981. The slump has not been quite so severe as during the 1974–75 recession, when output of chemicals and synthetics collapsed 28% in just six months. But it has been much more protracted. For 1982 as a whole, output will average about 15% less than the year before.

The recession, too, has engulfed almost the entire diverse chemical industry. For example, production of inorganic chemicals is down about 25% from two years ago, and organic chemicals about 30%. Plastics output is off about 15% and synthetic fibers more than 25%. Output of agricultural chemicals is 15% lower than it was at the start of last year. The only sector of the overall chemicals and allied products industry to show any growth during the past two years is pharmaceuticals, now, as usual, relatively recession resistant; production of pharmaceuticals is running about 5% above what it was in early 1981.

The slump has had a severe impact on chemical companies' operations. Plants are running far below capacity, for one thing. A C&EN survey last fall shows that for 32 basic chemicals, operating rates were just a little more than 60% of nameplate capacity, down from nearly 75% of capacity in early 1981 and about 80% of capacity during 1979. Little wonder, then, that the industry is cutting back on capital spending about 10% this year from 1981's outlays and probably will make cuts of a similar degree in next year's capital budgets.

Employment also is lower, by more than 50,000 workers since mid-1981 for the industry as a whole, a decline of about 5%.

The real crunch, however, shows up in companies' income statements. By and large, they are not awash with red ink, as is the case in such other industries as automobiles, steel, nonferrous metals, farm equipment, and machinery—although Celanese reported a loss in the third quarter largely as a result of the effect of devaluation of the Mexican peso on its Mexican affiliate. But for producers of industrial chemicals, profits were down about 35% during the first nine months of 1982 from the like period a year earlier. And for the year as a whole, they are likely to trail 1981's peak about 35 to 40%. And as a result, profit margins will have dwindled to a mere 4% of sales this year, compared to nearly 6% in 1981—and less than half of what they were before the 1975–76 recession.

Again, the only bright spot this year is among drug manufacturers. Through the first nine months of 1981, their earnings were about 20% higher than a year earlier, and they probably will end the year with at least a 15% gain. Their biggest problem has been strength of the U.S. dollar abroad and the resulting losses in translating results from their big foreign operations to U.S. earnings. However, pharmaceutical companies that also have an extensive stake in chemicals, like Upjohn and Eli Lilly, have been hurt by the decline in the overall chemical business.

Even as the recession lingers on, economists have turned cautiously optimistic about business prospects for next year. Already, several early signs of recovery are evident. The government's series of leading indicators has been edging higher for most of the past nine months. Interest rates, although still high, have been declining. Inflation has slowed to an annual rate of about 4% in recent months. Consumer confidence, at least, by some measures, has turned higher, after having plunged late last year and early this year. New housing starts have made a modest rebound from their deeply depressed level of about a year ago, and sales of new cars last month were relatively brisk. The surge in stock prices, meanwhile, suggests that Wall Street sees better days ahead by U.S. business.

The current consensus of economists is pretty well summed up by the Conference Board's forum of 13 economic analysts, who early this month confidently forecast that "a long-awaited U.S. economic recovery will finally arrive in 1983." The forum noted, however, that "growth will not be broad based and will fall far short of rates registered after previous recessions."

The Conference Board group

projects real gross national product to grow at only a 2.7% rate in 1983, which is less than normal for the first year of a business recovery. The rate of inflation will drop to about 5% next year, it adds, down from 6% this year. But unemployment will average close to 10% of the U.S. labor force, down only slightly from the current level of about 11%.

Charles B. Reeder, chief economist for Du Pont, generally agrees with this forecast. He sees recovery next year generated by lower interest rates and a rise in consumer purchasing power, with real disposable personal income increasing nearly twice as fast as this year. With inventories cut significantly, output will have to rise faster than demand, and Reeder looks for turnaround in production no later than next month.

On the other hand, he adds, growth will be undercut by a decline in capital spending through most of 1983. U.S. exports also will be hurt by a rise in the value of the dollar, so that the U.S. trade deficit will soar.

All in all, Reeder looks for relatively small increases in real gross national product of 2% and in industrial production of 4 to 5% in 1983. But he adds that with inflation and interest rates declining, "the recovery should be easily sustainable beyond 1983."

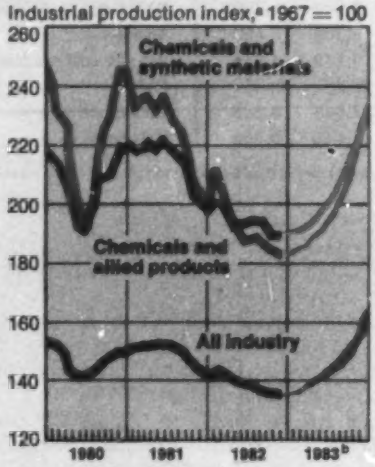
Union Carbide chief economist James F. Smith likewise expects consumer spending to lead the way to a recovery which, he says, "is finally taking hold in December." Smith thinks that gross national product (in constant dollars) will rise 3.3% in 1983, which he notes is only about half the growth usual in the first year of a recovery. But growth should be sustainable for at least three years, he adds, and "in an economy that has not moved in the same direction for longer than 270 days since June 1978, that will indeed be good news."

Certainly, recovery for the chemical industry hinges to a considerable degree on increased consumer outlays for such items as housing, cars, apparel, and appliances. Demand for homes and cars, in particular, is sensitive to interest rates and thus is expected to revive as the cost of borrowing declines.

The market for housing already is showing renewed life as basic mortgage rates fall slowly but steadily from the 16.9% rate of last July to an average of about 13.6% now, the lowest they have been since October 1980. Construction of new homes hit bottom in October 1981, when housing starts were at an annual rate (seasonally adjusted) of only 854,000. Since then, they have been moving upward shakily but gradually to a level of 1.12 million units last October, the most since May 1981. For 1982 as a whole, housing starts will total barely more than 1 million, the lowest number since the Commerce Department began collecting such data in 1959 and down 40% from just three years ago. Economists now are pegging next year's starts at 1.35 million to 1.5 million, a strong year-to-year gain but still well below the average annual rate of 1.8 million that prevailed during the 1970s.

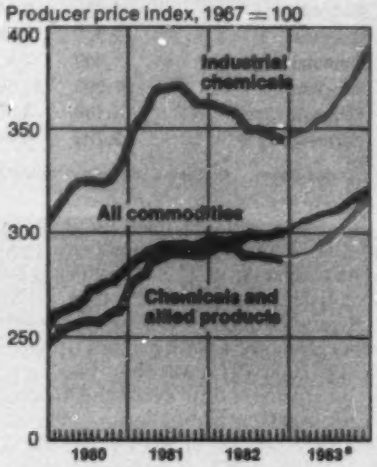
Economists also are hopeful that the automobile industry will be somewhat healthier in 1983. This year's output probably will be no more than 5.1 million cars, 18% lower than 1981's depressed level. Sales for the year are likely to be a mere 8 million units, 500,000 fewer than in 1981, with about all of the loss falling on U.S.-made autos. That means that domestic car sales, at 5.7 million units, will be at the lowest level in more than two decades. Next year, auto industry analysts are certain, will bring more robust sales as financing becomes less burdensome.

Next year will see a modest rebound in output...



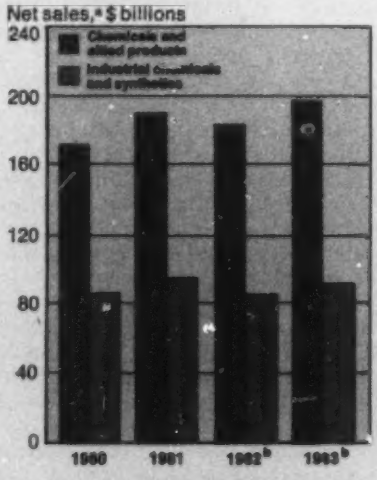
a Seasonally adjusted. b C&EN estimates.
Source: Federal Reserve Board

...and some recovery in chemical selling prices...



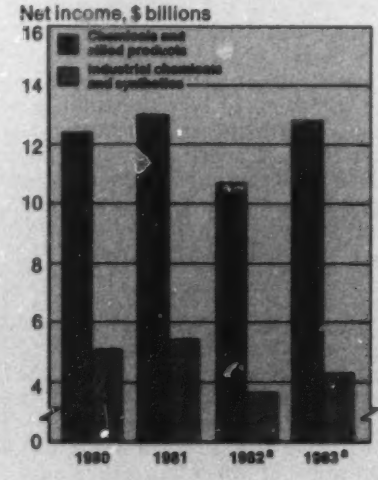
a C&EN estimates.
Source: Bureau of Labor Statistics

...which will help to revive sales volume...



a Excludes sales of foreign subsidiaries. b C&EN estimates. Source: Federal Trade Commission

...but won't restore profits to their previous peak



a C&EN estimates.
Source: Federal Trade Commission

Output of chemicals will make a moderate comeback next year after 1982's big slump

	1983	1982	1981	1980
INORGANIC CHEMICALS				
Thousands of tons unless otherwise indicated				
Ammonia	16,500	15,600	19,038	19,653
Chlorine gas	8,800	8,250	10,559	11,421
Hydrochloric acid	2,600	2,400	2,443	2,895
Nitric acid	7,800	7,400	9,039	9,232
Oxygen, billions of cu ft	400	370	431	431
Phosphoric acid	9,000	8,400	9,914	10,938
Sodium hydroxide	9,700	9,100	10,649	11,625
Sulfuric acid	33,500	31,900	40,675	44,272
ORGANIC CHEMICALS				
Millions of lb unless otherwise indicated				
Acetic acid	2,800	2,650	2,706	2,977
Acetone	1,900	1,750	2,167	2,076
Acrylonitrile	2,100	2,000	2,006	1,830
Benzene, millions of gal	1,250	1,100	1,348	1,585
Butadiene	2,500	2,000	3,046	2,799
Cumene	2,900	2,650	3,306	3,459
Cyclohexane	1,500	1,300	1,749	1,964
Ethylene	27,000	24,500	28,867	28,667
Ethylene glycol	4,150	3,850	4,055	4,386
Formaldehyde	5,200	4,750	5,855	5,555
Methanol	7,600	7,100	8,408	7,153
Phenol	2,300	2,100	2,551	2,568
Phthalic anhydride	800	725	811	818
Propylene	13,600	12,400	14,016	13,657
Styrene	6,400	5,900	6,612	6,856
o-Xylene	950	875	947	995
p-Xylene	3,300	3,000	3,696	4,238
PLASTICS				
Millions of lb				
Polyethylene, high density	5,100	4,700	4,695	4,405
Polyethylene, low density	7,800	7,250	7,693	7,291
Polypropylene	3,700	3,350	3,955	3,648
Polystyrene	3,500	3,250	3,621	3,521
Polyvinyl chloride	5,700	5,300	5,707	5,470
SYNTHETIC FIBERS				
Millions of lb				
Acrylic and modacrylic	690	625	691	779
Nylon	2,100	1,900	2,332	2,358
Olefin and vinyon	800	720	785	748
Polyester	3,350	3,050	4,176	3,989

Sources: Bureau of the Census, International Trade Commission, Society of the Plastics Industry, Textile Economics Bureau, C&EN estimates (for 1982 and 1983)

But the recovery, some suspect, will only bring sales of U.S.-made cars to just a little above 1981's total.

Officials in the synthetic fibers industry, too, are betting on an upturn during 1983, although they fear that textile imports will continue to cut into domestic production as long as the dollar remains high valued. As a result, they are forecasting another troublesome year, one in which output may pull itself back only to 1981's level.

The farm market has been another sore spot for chemical producers. Farm income has been depressed for three years in a row in the wake of surplus crop production and markedly lower prices. Farmers, consequently, have neither the means nor the incentive to increase their purchases of fertilizers and pesticides. Pesticides, in particular, had been relatively immune to previous recessions in agriculture. Meanwhile, exports of both fertilizers and pesticides have slowed as the dollar has strengthened. It seems still too early to judge whether next year will bring any improvement.

If a muted business recovery is about to get under way, next year will be a somewhat happier one for the U.S. chemical industry. But at the moment, at least, no one in the industry is expecting the rapid rebound that is typical of chemicals in past periods of recovery.

C&EN estimates that by the end of next year production of chemicals and synthetic materials will be about 25 to 30% higher than it is now. But that will put it back only to the level where it was 12 months ago, or perhaps a little bit below. In other words, output will have gone through four long years of relatively little or no growth. And for 1983 as a whole, production will be only 3 to 5% ahead of this year's unsatisfactory rate.

Increased demand and higher operating rates, however, should bring the industry some much needed relief from the depressed selling prices that have plagued it since early this year, if not before. Prices of industrial chemicals, on the average, are about 5% lower than a year ago, according to Bureau of Labor statistics. Next year, they can be expected to start rising again, although it may well be not until late next year that they recover to the peak level reached during the summer of 1981. For the year as a whole, prices of industrial chemicals are likely to average 2 to 3% higher than this year, when they were down nearly 3% from 1981.

That means that sales also will be higher for the basic chemical industry, after having dipped an unprecedented 10% this year. C&EN estimates that the dollar volume of sales can be expected to increase 5 to 10%, which would still keep it slightly beneath 1981's record high.

Profits should be much improved, as well. Wall Street analysts are figuring on a gain of about 30% in earnings for the leading producers of industrial chemicals in 1983. But even so, earnings will be well below what they were in 1981—or, for that matter, in either of the two preceding years as well.

For the entire chemicals and allied products industry, next years's results likewise will have a bit more luster. Continued health for pharmaceutical makers, whose earnings are likely to be up 15 to 20%, will get much of the credit, but so will a smart comeback for many producers of specialty chemicals, who are having a rare relatively poor year in 1982.

Sales for the overall industry are likely to rise 8 to 10%; this year they will be down about 3 to 5%. And profits probably will rise 20 to 25%, after a drop of 15 to 20% in 1982. That means that profits probably will be about at the same level as last year, which was their highest ever. □

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Worldwide recession slams the brakes on foreign trade in chemicals

FOREIGN TRADE

Stagnant economies abroad and strong dollar stymie growth in U.S. chemical exports and squeeze chemical trade surplus

Earl V. Anderson, C&EN New York

World trade has grown so rapidly for so long that it has just about come to be taken for granted that growth would continue. That has proved to be wishful thinking. Even trade is not immune to the recession that has spread virtually throughout the world.

After chalking up an unblemished record of growth since 1958, the value of world trade (measured as exports) dipped 1.6% last year to $1.96 trillion. It is virtually certain to drop another 4 to 5% this year.

That means that world exports will have to wait awhile before they can boast of being a $2 trillion economy in their own right. They topped out at $1.99 billion in 1980.

What makes this pill of realism so hard to swallow is the recent history of world trade growth. In the three-year period from 1977 to 1980, world exports grew an average 20% per year. Admittedly, much of that growth represents the international flow of oil at inflated prices. But manufactures and agricultural products contributed their share.

Why the sudden turnaround? Obviously, economies throughout the world are in trouble. But there is no single or simple explanation for these economic problems. Many interrelated factors are involved; they are synergistic.

In industrialized and developing nations alike, stagnant economies result in a lower need to import. And there can be no exports without imports.

In many nations, particularly developing countries, current account balances are deteriorating. Debt service charges are mounting. Mexico is the prime example, but it is only one example. As a result, import quotas, special import fees, and a variety of other import restrictions are cropping up throughout the world. Many free traders in good times become protectionists in bad times.

This shifting is what lay behind the ministerial-level meeting of GATT (General Agreement on Tariffs & Trade) in Geneva last month. To some, results of the meeting were a disappointment. The ministers could not agree to remove some of the trade barriers that have arisen during the recession. But they did at least agree that their countries should avoid erecting new ones. Given the pessimism that surrounded the meeting, perhaps that was the best that could be expected.

In such an economically and politically sensitive climate, chemical exports could hardly thrive. And they haven't.

Chemical exports had been one of the brightest stars on the world trade horizon, rising from $61 billion in 1975 to more than $147 billion in 1980. That's a resounding 19.5% average annual growth rate.

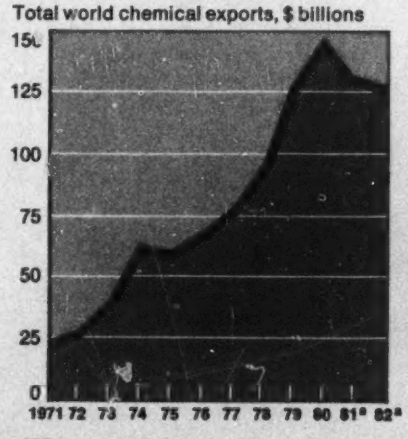
However, sagging import demand took its toll last year. World chemical exports tailed off 11% to $131 billion. With no improvement in the economic scene this year, they will drop again—to an estimated $126 billion.

Aided to a large degree by its feedstock advantage, the U.S. chemical industry managed to escape last year's axe. U.S. chemical exports edged up a slim 2% to $21.2 billion.

This year, however, the U.S.

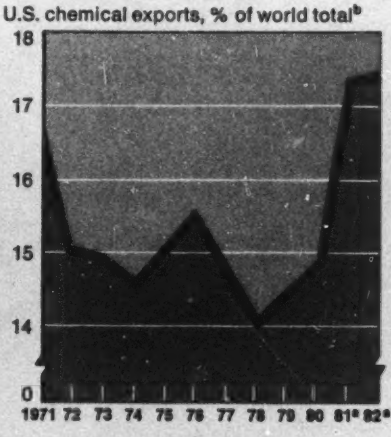
World trade in chemicals falters again this year...

Total world chemical exports, $ billions



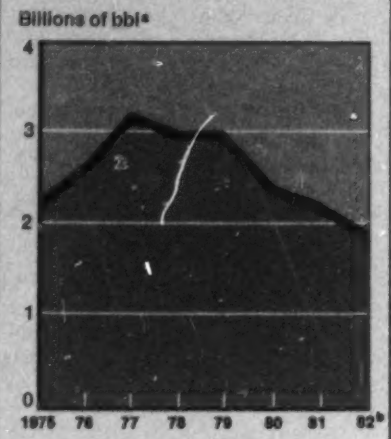
... but U.S. share is the highest in a decade

U.S. chemical exports, % of world total[b]

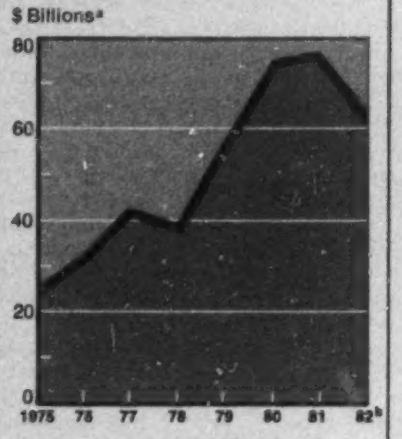


a C&EN estimates. b Defined as: U.S. chemical exports as per cent of world chemical exports less U.S. chemical imports. Sources: United Nations, Bureau of the Census

Volume of U.S. oil imports continues to decline...

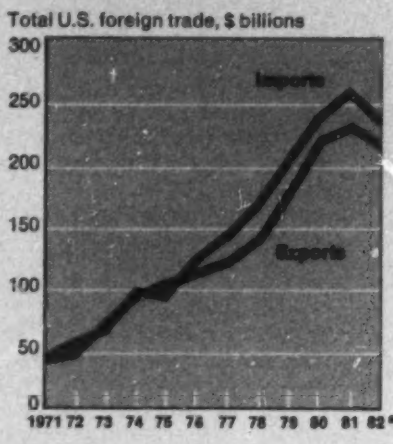


...as, for a change, so does their value

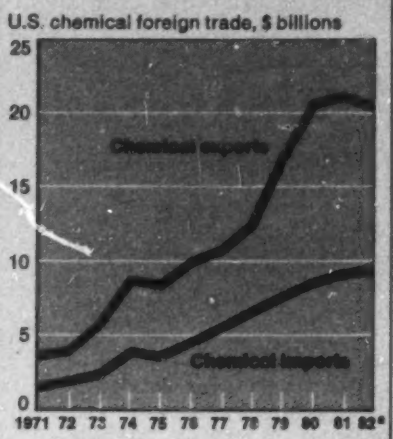


a All petroleum products. b C&EN estimate.
Source: Bureau of the Census

U.S. exports and imports are down this year...



...and the chemical trade balance narrows a bit



a C&EN estimates. Source: Bureau of the Census

chemical industry won't be as fortunate. World economic conditions finally will catch up with U.S. exports of chemicals, which probably will end the year at $20.4 billion, 3.7% lower than last year.

The losses were spread widely throughout various segments of the chemical industry. The only gains were registered by medicinals, radioactive materials, and pesticides.

Organics and inorganics, two big-volume product groups, will be down 5% and 12%, respectively. One of the hardest hit groups, however, will be fertilizer exports, which are likely to drop a hefty 19% to $1.4 billion. Plastics and resins, the second largest chemical export category, will squeak by with only a slight 1% drop.

Despite their economic problems, some major markets are holding up surprisingly well for U.S. chemical exporters. Western Europe, by far the largest foreign outlet, will import nearly as much chemicals from the U.S. this year as it did last year.

And U.S. chemical shipments to Japan actually will increase about 2% to $2.4 billion, even though Japan's economy is struggling and chemical demand there is weak. However, Japan's chemical industry is one of the world's high-cost producers, and imports are taking an increasingly large share of the Japanese market.

Canada and Latin America are particularly disappointing markets for U.S. chemical exports this year. That should come as no surprise.

In Canada, the recession is worse than it is in the U.S. and recovery

Organic chemicals, fertilizers lead drop in U.S. chemical exports; imports show little change

$ billions	U.S. chemical exports				U.S. chemical imports			
	1982[a]	1981	1980	1979	1982[a]	1981	1980	1979
Organic chemicals	$ 5,630	$ 5,929	$ 5,667	$ 5,055	$2983	$2974	$2539	$2159
Plastics and resins	3,774	3,809	3,884	3,241	756	780	646	626
Medicinals and pharmaceuticals	2,264	2,165	1,932	1,591	557	583	508	441
Inorganic chemicals	2,020	2,286	2,106	2,712	1510	1573	1323	1106
Fertilizers, manufactured	1,408	1,735	2,265	1,404	991	1181	1104	976
Radioactive materials	1,142	988	833	937	1047	786	989	953
Pesticides and disinfectants	653	544	553	516	302	283	263	190
Flavors, perfumes, cosmetics, and toiletries	510	535	479	399	284	289	301	263
Pigments, paints, and varnishes	326	349	304	273	104	102	89	76
Cleaning and polishing materials	326	396	327	290	76	74	72	73
Dyeing, coloring, and tanning materials	163	175	186	177	208	226	194	185
Explosives and pyrotechnics	82	90	87	62	66	61	59	58
Miscellaneous	2,102	2,187	2,087	1,649	586	534	496	379
TOTAL	$20,400	$21,187	$20,740	$17,306	$9450	$9446	$8583	$7485

a C&EN estimates. Source: Bureau of the Census

Exports to American customers particularly hard hit this year

$ Millions	1982[a]	1981
U.S. CHEMICAL EXPORTS		
Canada	$ 2,244	$ 2,478
Latin America	3,876	4,469
Western Europe	6,242	6,251
Eastern Europe	306	347
Japan	2,407	2,349
Communist Asia	490	405
Middle East	551	517
Rest of Asia	2,693	2,598
Australasia	694	778
Africa	530	642
Other	367	353
TOTAL	$20,400	$21,187
U.S. CHEMICAL IMPORTS		
Canada	$2,504	$2,916
Latin America	605	669
Western Europe	4,167	3,917
Eastern Europe	142	131
Japan	898	956
Communist Asia	151	126
Middle East	113	110
Rest of Asia	217	197
Australasia	284	186
Africa	227	117
Other	142	121
TOTAL	$9,450	$9,445

a C&EN estimate. Source: Bureau of the Census

there will be slower. Meanwhile, Canada's chemical industry, gearing up to supply not only its own market but world markets as well, is running at unprofitably low operating rates. As a result, Canada will spend 9% less on U.S. chemicals ($2.2 billion) this year than it did last year.

In some of the major Latin American countries (Mexico, Brazil, Argentina, and Venezuela), economic conditions range from stagnant to disintegrating. Mexico and Brazil shoulder the world's largest foreign debt burdens. They and other Latin American countries are slapping tight controls on imports. This hurts U.S. chemical exporters because Latin America had been a $4 billion outlet for their products. This year, that market will shrink 13%.

As long as much of the world is floundering in an economic quagmire, there is little hope that U.S. chemical exports can improve significantly. And, as feedstock costs in the U.S. rise gradually to world levels, any improvement will become increasingly more difficult to realize.

But there is another handicap under which U.S. chemical exporters—indeed, all U.S. exporters—are operating. That is the U.S. dollar. The dollar has regained its old title as the world's strongest currency.

That, however, is a mixed blessing. Psychologically, Americans at home get a lift from it; Americans touring abroad find their dollars stretching further. To some extent, a strong dollar has helped in the battle against inflation in the U.S. But it also has cost U.S. exporters a competitive edge. A strong dollar makes exports more expensive to sell on world markets. And, by making imports less expensive, it enables them to penetrate the U.S. market more easily.

The Federal Reserve Bank of New York estimates that the appreciation of the dollar through this summer can be expected to increase the U.S. merchandise trade deficit by as much as $45 billion by the end of 1983. Export sales, the bank figures, will be roughly $35 billion lower than they would have been with a weaker dollar, but imports will be $10 billion higher. These estimates may be inexact. But they show clearly that currency exchange rates can take their place alongside economic conditions and trade policy as a major determinant in U.S. chemical trade.

With the U.S. economy in something less than great shape, it no doubt was the strong dollar that enabled foreign chemical companies to increase their shipments to the U.S. last year and to keep them at about the same level this year.

Although U.S. chemical exports grew only 2% in 1981, imports jumped 10% to $9.4 billion. As a result, the heralded chemical trade surplus slipped from $12.1 billion to $11.7 billion.

This year, while U.S. chemical exports are falling, imports are inching upward to $9.5 billion. Although that's a negligible advance, it still represents quite an achievement in this year's economic climate. It also means that the U.S. chemical trade surplus will dip to about $11 billion.

Although no one is expecting miracles next year by any stretch of the imagination, economic conditions probably will improve in many countries. U.S. chemical exports, then, probably will at least remain at 1982 levels and may even move upward slightly. With even a modest pickup in U.S. business activity, imports likely will increase again.

But factors other than economics influence trade flows. Much depends, for instance, on how successful world leaders are in curbing protectionism. France already has devised new rules to brake imports and stimulate exports. The U.K. is considering import controls, and Canada may toughen its import regulations. □

U.S. foreign trade declines for most product categories

$ Billions	1982[a]	1981
U.S. EXPORTS		
Chemicals	$ 20.4	$ 21.2
Machinery and transportation equipment	90.5	95.7
Other manufactured goods	33.9	37.3
Food and live animals	25.3	30.3
Beverages and tobacco	2.7	2.9
Mineral fuels, lubricants, and related materials	13.0	10.3
Crude materials (inedible) other than fuels	19.8	21.0
Animal and vegetable oils and fats	1.6	1.7
Miscellaneous products	6.7	8.4
TOTAL[b]	$216.5	$233.7

$ Billions	1982[a]	1981
U.S. IMPORTS		
Chemicals	$ 9.5	$ 9.4
Machinery and transportation equipment	75.0	69.7
Other manufactured goods	62.3	63.4
Food and live animals	14.1	15.2
Beverages and tobacco	3.2	3.1
Mineral fuels, lubricants, and related materials	65.5	81.4
Crude materials (inedible) other than fuels	8.7	11.0
Animal and vegetable oils and fats	0.3	0.5
Miscellaneous products	7.4	7.3
TOTAL	$246.0	$261.0

a C&EN estimates. b Includes re-exported imports (not included in individual product categories). Source: Bureau of the Census

Reduced supply may be only way to restore health to an ailing chemical industry

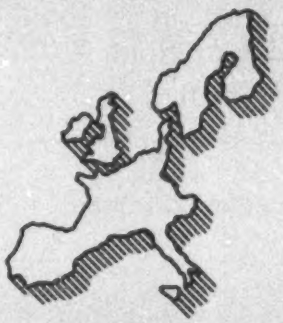
"1983 and the period beyond will confirm that the chemical industry in Europe isn't going to be as big as we used to think," declares David R. Clair, president of Essochem Europe. "Companies will have to implement aggressive cost-cutting and capacity reduction programs consistent with a lower-growth scenario."

Clair's admonition is in line with the ideas of other leading figures in the western European chemical industry. They articulated their thoughts more loudly and more clearly as this year progressed. For example, Jan H. Choufoer, managing director for chemicals at Royal Dutch/Shell, speaking at the Society of the Chemical Industry's meeting in Brussels in October, said, "There must be action taken to staunch the $200 million-per-month estimated level of losses. The process will be hard, as it will involve major reductions in capacity. The resultant industry will be smaller, of course. But the basic objective must be to ensure that European producers, who must continue to meet the major part of European demand, can thrive in the future."

In a similar vein, Aarnout A. Loudon, president of Akzo, the chemicals and fibers giant headquartered in Arnhem, the Netherlands, told the European Petrochemical Association's meeting in Venice this fall, "We are faced all over Europe with overcapacities and disastrously fierce competition. This is presenting a serious threat to the continued existence of the chemical industry."

Noting that a gap of as much as 40% now exists between western European production capability for most commodity chemicals and actual output, Loudon makes the point that "without clearcut effective action, there is no prospect of recovering a proper balance between supply and demand. Growth of only a few percentage points a year is so small that without such action, no balance can be attained before 1990."

Correcting overcapacities means that companies need to put their houses in order. But it takes courage and self-discipline to close production units permanently, especially if they



WESTERN EUROPE

Many chemical executives see plant shutdowns rather than growth in demand as best cure for present excess capacity

Dermot A. O'Sullivan, C&EN London

are modern plants and basically efficient.

However, as Loudon points out, "The alternative is nothing less than a life-and-death battle between competitors, which can have the gravest consequences for the very survival of their companies and the preservation of jobs." Adds Essochem's Clair, "The industry must realize that restructuring occurs when each company, whether private or public, refuses to accept poor profitability and makes some tough decisions about its marginal operations. Hoping that the actions of others will save us will only prolong our individual agonies."

Certainly, western European chemical producers have been going through their "individual agonies" this year. For many, profits are down from 1981 levels. Among the three largest chemical firms in West Germany, for instance, pretax profit of BASF between January and September was off almost 40%, that of Bayer was down 20%, and Hoechst's pretax earnings declined nearly 24%.

Some firms have fared better, however. In the U.K., for instance, Fisons did an about-face during this year's first six months, moving into the black to the tune of $10.5 million against a $1.5 million loss in the like 1981 period. Ironically, however, its change of fortune stemmed from this year's sale of its fertilizer operations, a business the company was founded on, to Norway's Norsk Hydro. Others that have shown gains against year-earlier losses are Rhône-Poulenc in France, and Solvay and UCB in Belgium. Their improvements reflect corrective measures their managements have put into effect.

"There is growing awareness of the problems to be faced," remarks Paul Van der Grinten, vice president of planning and development at DSM in the Netherlands. "This will lead, in 1983, to a further decrease in the number of companies active in the petrochemicals sector, a prerequisite for capacity reductions."

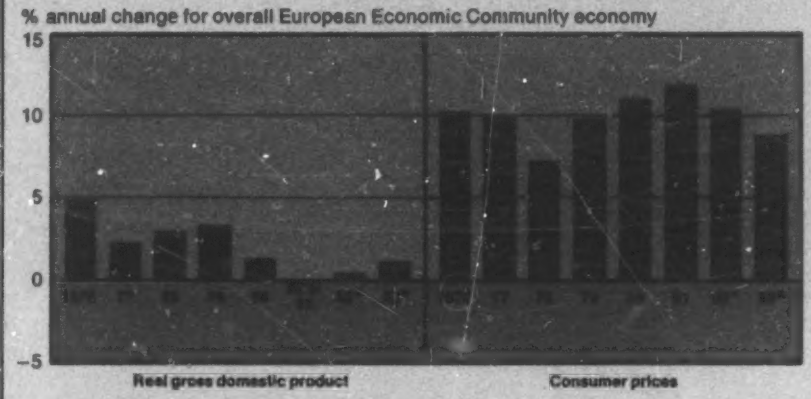
So it is that top European chemical executives now are doing more than just thinking about what was all but unthinkable a short while back. Positive steps are under way to reorganize, retrench, and reshape their businesses.

These steps include shutting production units and trimming staff. In Belgium and the Netherlands, the number of chemical industry workers has fallen 1% in the past 12 months. In West Germany, the drop is 2.5%, coupled with increased incidence of short-time work scheduling. In the U.K., the chemical labor force has been cut back 3.6% this year.

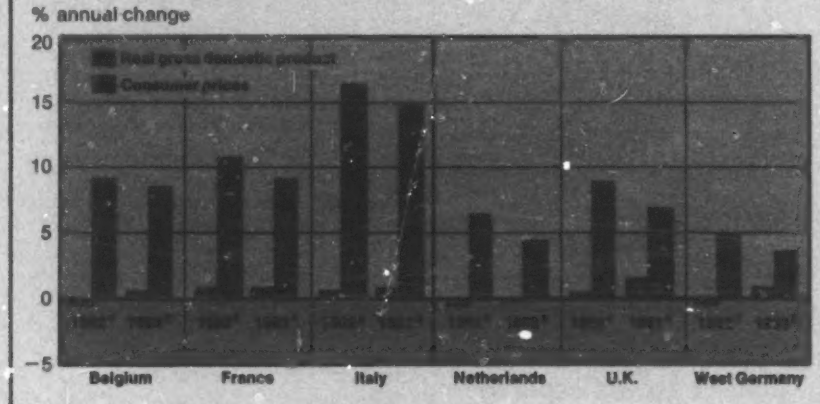
Even the ranks of white-collar workers and of corporate executives aren't escaping the drive to economize. One example is Royal Dutch/Shell's decision to shift its research emphasis. The 4000 or so workers at the company's four European research and development centers will be reduced about 20% during the coming three years.

Overhead expenses are coming under greater scrutiny, too. Monsanto U.K. made a quiet departure from its

Economic recovery will be slow but inflation is easing...



...throughout major Western European countries



a Estimated. **Source:** Commission of the European Communities

block-long London headquarters earlier this year to more modest premises nearby. The move, the company says, was the result of a decline of its work force. But termination of the lease saved Monsanto 23 cents a share in the third quarter, just short of 13% of total per-share earnings and more than enough to offset the cost of shutdown of its U.S. polyester staple business.

Nor has Monsanto been alone in switching office locations. Du Pont moved its U.K. central staff some 30 miles out of London last year. And just recently, directors of Imperial Chemical Industries made the startling announcement that they are preparing to leave their fortresslike London headquarters, occupied since the company was formed in 1926.

In ICI's case, the decision reflects a change in management policy and style that John Harvey-Jones has been pushing through, following his appointment as chairman in April. He has gone on record as saying that he seeks to introduce as many changes as the company can bear. Opting to leave IC House was "the most devastating decision for an ICI man to take," he admits. "But I believe that leadership has got to be by example, and has got to start at the top."

ICI's move to a new London headquarters isn't being made primarily on economic grounds, although it should result in substantial cost savings over the long term. Rather, the reason is strategic, stemming from the company's main board members having less involvement in day-to-day running of the business than they have had in the past. Instead, they will concentrate on such larger issues as portfolio management, strategic planning, and the overall direction of the company. Nonboard support staff will relocate at divisional headquarters elsewhere in the coming months. Precisely how many ICI people will remain in London isn't known yet, but the number will be considerably less than the current 1000 or so.

Dow Chemical also has been active in the recent retrenchment in European chemicals. Last month, the company announced its intention to pull out of its 49% interest in DINA, a Yugoslavian company formed in 1976 with Yugoslavia's Industrija Nafte (INA). The break becomes effective Jan. 15.

DINA is nearing completion of the first of a three-part petrochemical complex on Krk Island, just off the Yugoslavian coast. When it starts up next year, units there will have capacity for making 440 million lb of vinyl chloride, 330 million lb of ethylene dichloride, and 154 million lb of low-density polyethylene annually. Phase two involves a 440 million lb-a-year styrene plant. Phase three centers on a naphtha cracker, with an ethylene output capability of 880 million lb yearly, as well as units for making benzene (396 million lb), and high-density polyethylene (110 million lb).

There is some question as to whether phases two and three will materialize now that Dow has withdrawn from the venture, although Dow has told INA of "its willingness to cooperate on a new basis." Precisely what this implies isn't clear as yet.

When the project was launched, it was expected to cost $700 million and to be completed this year. Now, costs are expected to exceed even a $1.2 billion reassessment. The difficulty Yugoslavia is having in raising the necessary hard currency against the background of its weak financial situation, coupled with the global downturn in the petrochemicals business, prompted Dow's exit.

Besides, the move is in line with Dow management's desire to reduce its heavy debt burden and to lessen its involvement in the shaky commodity petrochemicals business. It wants to concentrate, instead, on specialties that provide better profit margins. Toward this end, Dow already has made changes in its partnerships in Asia and this month withdrew from its joint venture in Saudi Arabia.

Heavy losses in petrochemicals either must be written off by the shareholders, which is the government in many cases, or against profits from companies' other activities, such as pharmaceuticals, that are making money. "Now we are seeing these losses financed by increased borrowing," points out Jan J. Slechte, who heads Shell International Chemical's petrochemicals division. "As a result, the ratio of loan finance to shareholder equity, sometimes referred to as 'gearing,' has risen alarmingly.

"In periods of profitable growth, it may be a sound decision to increase a company's gearing to increase the asset base. But when cash is not being generated, seeking to cover the deficit

by increased borrowing merely mortgages the balance sheet for continued operations.

"With the current lack of pricing discipline in the marketplace, companies are barely covering their variable costs and direct fixed costs. They are actually having to borrow to cover interest payments on loans, other fixed costs, and minor capital investment items. A better understanding of the extent to which this is happening would help management decide to raise prices or stop selling. Better financial discipline would help accelerate rationalization."

Certainly, a greater degree of rationalization is evident now than a year ago. Steps being taken include portfolio swaps and the creation of joint ventures. In February, for instance, Akzo Zout Chemie and Shell Nederland Chemie formed a joint venture, Rotterdamse Vinylunie, or Rovin for short, to bolster their respective positions in vinyl chloride and polyvinyl chloride. In the past, Akzo has been making vinyl chloride near Rotterdam using its own chlorine and ethylene supplied by neighboring Shell. The monomer then was sold to Shell for conversion to PVC. Now both companies participate in the entire operation.

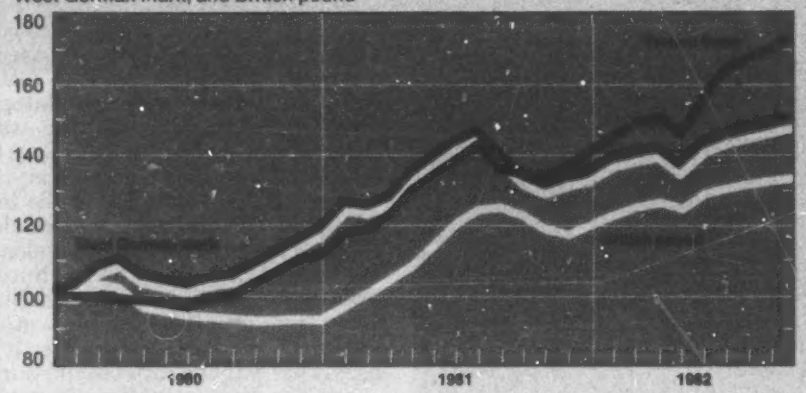
The arrangement hasn't fundamentally changed the existing infrastructure, and PVC capacity remains at 396 million lb per year, Slechte admits. "But through this combination, there is a stronger operational unit, which increases leverage over a number of competitors," he points out.

ICI also has strengthened its longstanding PVC position in Europe through acquisition of the PVC operations of Lonza, the chemicals arm of Switzerland's Alusuisse. The purchase, which will be phased over three years beginning Jan. 1, will include polymer units at Sins, Switzerland, and Waldshut, West Germany, that have a combined annual capacity of 176 million lb. In itself, this isn't particularly large. But the move lessens competition in the market and adds to ICI's existing 253 million lb-a-year PVC capability at Wilhelmshaven, West Germany.

In a more daring PVC-related step, BP Chemicals and ICI entered into a product swap agreement in the U.K. this past summer. BP Chemicals transferred to ICI its new 198 million lb-a-year PVC plant at Barry, Wales. At the same time, it closed down a 132 million-lb unit there, along with associated chlorine, ethylene dichloride, and vinyl chloride operations. For its part, ICI will transfer its 154 million-lb low-density polyethylene plant at Wilton, England, to BP Chemicals, along with its technology and U.K. customer order book; close two older units; and withdraw from the U.K. low-density polyethylene business. Through this maneuvering, ICI eventually will emerge with a European PVC capacity of more than 1.25 billion lb, making it the second largest producer of the polymer in Europe after Belgium's Solvay.

European currencies weaken further against U.S. dollar

Relative value of U.S. dollar vs. French franc, West German mark, and British pound[a]



[a] January 1980 = 100.

A more complex and far-reaching intercompany realignment is under way in Italy. There, three corporate entities are directly involved—Ente Nazionale Idrocarburi (ENI), the Italian state-owned hydrocarbons and chemicals concern; Enoxy Chemical, jointly owned by ENI and Occidental Petroleum; and Montedison, Italy's largest private chemical company—with the Italian government standing in the wings.

Enoxy Chemical's growth has been rapid during its 12-month existence. The company has assumed ownership of the U.K.'s former International Synthetic Rubber Co. But it is in Italy where most of its acquisitions have taken place, with encouragement from the Italian government, which has been seeking ways to improve the country's ailing chemical fortunes. Enoxy now has 56 plants there, making a wide range of products including lower olefins, high-density and low-density polyethylene, polypropylene, polystyrene, chlorine, vinyl chloride, PVC, and a range of synthetic rubbers and latexes.

Last month, a new 1.32 billion lb-per-year (of ethylene) cracker, Western Europe's largest, owned jointly by Enoxy and Montedison, came into production at Priolo, Sicily. Enoxy Chemical is to take over sole ownership of the cracker, together with complete segments of Montedison's petrochemical activities.

In the new lineup, as now envisioned, Enoxy will be the single Italian producer of acrylonitrile-butadiene-styrene resins, high- and low-density polyethylene, PVC, and synthetic rubber. Enoxy's polypropylene and polystyrene activities, meanwhile, will pass to Montedison.

France is where the most widespread national realignment of the chemical industry is taking place. The development is a direct outgrowth of the nationalization of leading companies by France's socialist government under President François Mitterand, voted into office last year.

One result is that Produits Chimique-Ugine-Kuhlmann (PCUK), the erstwhile chemicals arm of Pêchiney-Ugine-Kuhlmann, ceases to exist. Production facilities for an extensive range of chemicals both in France and elsewhere are being shared between CdF Chimie, Entreprise Miniere et Chimique, Rhône-Poulenc, and Société Nationale Elf-Aquitaine, all state-owned companies. Research and development activities will be absorbed by Elf. ICI, meanwhile, is taking over PCUK's dyes and pigments division. This mammoth French undertaking will take months to complete. It will entail numerous plant closures and the problem of coping with the 12,500 or so workers who will be affected.

France's fertilizer industry also is going through a shakeup. Details have yet to be finalized. But it is likely that about 12 of the country's 34 fertilizer

West European petrochemical capacity is now far above demand

Billion of lb	1981	1985	% annual change
Ethylene			
Effective capacity	34.8	33.7	−0.8%
Consumption	22.6	26.0	3.6
Propylene			
Effective capacity	19.2	18.9	−0.4
Consumption	12.6	14.5	3.6
Benzene			
Effective capacity	15.1	15.9	1.2
Consumption	9.3	10.6	3.2
Polyethylene, high density			
Effective capacity	4.4	4.7	1.5
Consumption	3.1	3.5	4.4
Polyethylene, low density			
Effective capacity	11.0	10.5	−1.2
Consumption	7.4	7.5	0.6
Polypropylene			
Effective capacity	4.8	4.9	0.6
Consumption	3.0	4.0	7.8
Polystyrene			
Effective capacity	5.6	5.6	−0.6
Consumption	3.4	3.8	2.5
Polyvinyl chloride			
Effective capacity	11.1	11.3	0.4
Consumption	7.6	8.4	2.5

Source: European Council of Chemical Manufacturers' Federations, ChemSystems

facilities will be shut to make this sector of the chemical industry more efficient and reverse its losses.

France's nationalization program has had an indirect effect on the European chemical industry as a whole. Jean Gandois resigned as head of Rhône-Poulenc because of disagreement with the government's policies within weeks of taking over the presidency of the European Council of Chemical Manufacturers' Federations (CEFIC). A trans-European scramble ensued to find a replacement for him at CEFIC. The post now has been filled by Mario Schimberni, Montedison's president.

Voicing CEFIC's viewpoint on how the present situation in Europe might be remedied, Schimberni states, "The industry itself must face the major structural problems that are troubling it. It must be capable of reaching an equilibrium between supply capability and market demand in a reasonable time."

A dialogue of sorts was begun with the commissioners of the European Communities when the leaders of eight companies visited them at their Brussels headquarters last July. Represented were ATO Chimie, BASF, DSM, Hoechst, ICI, Montedison, Royal Dutch/Shell, and Solvay. The meeting was to alert the commissioners to the problems that European makers of bulk thermoplastics are going through and to sound them out on their responsiveness to some form of industrywide regulatory mechanism. Nothing definite was decided, but the door remains open if future talks are deemed necessary.

Opinion is divided within the industry on the desirability of establishing a crisis cartel somewhat along the lines of that set up by the European man-made fibers producers. But apart from differences in basic attitudes toward such a measure, it's hardly likely that a cartel would work in practice. For one thing, many more companies are involved, some 20 per product. Moreover, a number of them are subsidiaries of U.S. concerns, and U.S. antitrust regulations would stand in the way of their participating in any collaborative dialogue between competitors.

On the synthetic fibers front, agreement has been reached between nine European Economic Community producers to trim overall capacity further. The plan was drawn up under the guidance of the Paris-based International Rayon & Synthetic Fibers Committee (CIRFS). It calls for a cutback of some 1.1 billion lb from the 6.4 billion lb total capacity of acrylic fiber, nylon, polyester filament and staple, and nylon carpet yarn. This follows an 880 million lb reduction in capacity instigated in 1978.

Output of synthetic fibers in Western Europe will be down from last year to 1.42 billion lb for acrylic, 1.25 billion lb for nylon, and 1.59 billion lb for polyester. What this means is that neither acrylic nor polyester fibers underwent any significant change in annual production between 1977 and 1982, whereas production of nylon fibers declined by an average 3.3% a year during the same period.

Du Pont now is out of commodity synthetic fibers production in Europe with the closure this year of its polyester filament yarn plant at Uentrop, West Germany. However, the company is firmly committed to continuing business in Europe. It still makes polyester staple and fiberfill and nylon 66 staple and carpet yarn, together with polyamide resins, at Uentrop. A major polyester elastomer operation in Luxembourg will be completed in 1984. Expansions to the fluorinated chemicals complex at Dordrecht, the Netherlands, will make it the largest anywhere, the company claims. Its Hypalon chlorosulfonated polyethylene facility at Maydown, Northern Ireland, will come on stream next year. All told, Du Pont is investing $300 million on these and other projects. This year also saw the launch of Du Pont's pharmaceuticals in Europe.

The malaise of Western Europe's chemical industry is a direct reflection of the weak economies not only of countries in Europe, but elsewhere. All areas of industrial activity are down, from automobile output to steel, and unemployment levels are high. Indeed, the EEC annual economic report this year makes for some grave reading. It points to the very real possibility of the European economy entering a long period of slow growth, or even depression.

"The recovery forecast last spring for the second half of 1982 has not materialized," it states. "The positive factors in the second half of 1981, which appeared to be pointing to an upswing, were reversed. The outcome for 1982 is approximate stagnation, with a rise in volume of output in the community of only 0.3%.

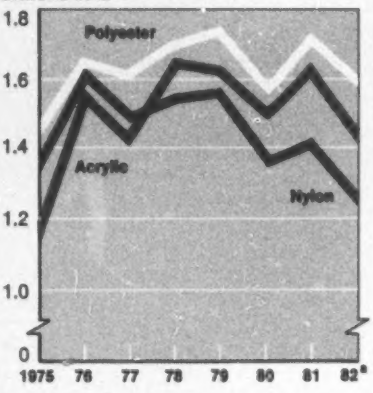
"The forecast suggests that the trend of output growth is likely to remain weak. World trade should recover somewhat in 1983, but it is unlikely that the foreign sector will make an important contribution to growth in the community. The European economy is seen as having a second downward phase in a double-dip recession. The beginnings of a recovery phase have clearly been extinguished."

As for labor, the number of unemployed in EEC now stands at about 11 million, 9.4% of the labor force. This is likely to rise during the second half of next year "to reach well over 12 million." Worst hit are Belgium, where unemployment now stands at about 14%, followed by Ireland and the U.K., with the unemployment rate exceeding 12% in both. Denmark, France, Italy, and the Netherlands aren't far behind.

On a somewhat brighter note, the report points out that "some limited progress is being made in the struggle against inflation. It is expected to fall faster in 1983 than was expected previously." The rise in consumer prices for the EEC as a whole this year averaged 10.5%, compared to last year's 12%. For 1983, the increase is expected to fall back further to around 9%.

Those countries with the dubious distinction of having the highest inflation levels are Greece (23%), Ireland (19%), and Italy (17%). The U.K.

Fiber production stumbles again this year



a Estimates. **Source:** CIRFS (International Rayon & Synthetic Fibers Committee)

successfully moved into single figures to just under 9%. The rate of inflation in the U.K. is expected to decline to 7% next year if the government can maintain its deflationary policies.

Concern about job security tended to keep wage rises this year at a lower level than in the recent past. This is one positive factor sited by chemical companies that C&EN has polled. The French government, in fact, imposed a wage and price freeze for several months during the year. And salaried employees throughout West Germany's chemical industry will have to forego their customary end-of-year pay adjustment, now postponed until next summer. A hoped-for effect of this move is that worker unions will temper their demands at the forthcoming round of wage negotiations.

Another favorable factor that petrochemical companies point to is that the prices of hydrocarbon feedstocks—oil and naphtha—have remained steady throughout 1982. There's a catch here, however. Hydrocarbons are priced in U.S. dollars. And the dollar's continued strength against European currencies during the past three years has meant that the prices of oil and naphtha in terms of European money have risen noticeably.

This year alone, the dollar strengthened by more than 10% against the West German deutsche mark, by 11% against the British pound, and by almost 23% against the French franc. The franc's case admittedly wasn't helped by a 9% devaluation at midyear. The U.K.'s Department of Industry attributes last month's 2.1% increase in the price of fuel and raw materials to the October fall in the pound's value.

The parity of a country's currency, of course, is something of a two-sided coin. Although a strong dollar raises the local price of oil and related products in weak currency areas, it provides a stimulus to exports from those countries. It also lessens the competitive threat of imports arriving from dollar trading zones.

A strong dollar notwithstanding, there are instances of proven and alleged dumping of U.S. chemicals on western European markets. There now are 24 products, ranging from ammonia-based fertilizers to vinyl acetate, in various stages of investigation by the EC Commission, more than half of them arriving from the U.S. Most of the cases have arisen from complaints that CEFIC launched on behalf of local producers.

The most recent action involves U.S. natural soda ash. Last month, the commission set a provisional antidumping duty of upward to $22.40 a ton on the material, with the exception of that sold by Allied and FMC, who are making price adjustments. According to CEFIC's figures, imports of U.S. soda ash into EEC rose from 31 million lb in 1979 to nearly 106 million lb last year. They went up further to an estimated 217 million lb in this year's first nine months.

In all fairness, the U.S. isn't the sole target of dumping investigations. A provisional antidumping duty was put on Bulgarian soda ash last June. Indeed, nine of the 24 products considered as being dumped in the EEC originate in Eastern Europe.

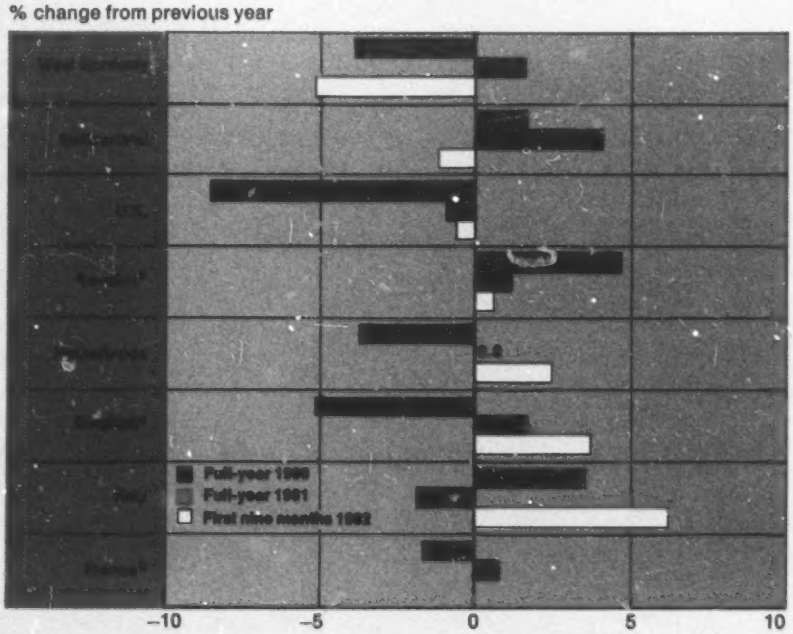
With demand down and competition intense, there have been increasing hints in some government circles about the need to establish some protectionist measures. Chemical executives generally oppose any move in that direction.

"The rise of unemployment is becoming less and less acceptable politically, and import restrictions are looked at as a quick fix," admits Shell International Chemical's Slechte. "But they are a potential drug in the system, and there is a great danger of people becoming dependent on them.

"When industry is in the sort of difficulty that we have today, managers intuitively look to factors over which they haven't control, like imports from the East Bloc, the U.S., the Middle East, and Canada or the strength or weakness of the currency in which they are operating. All these obviously count. But they are an inadequate excuse for the industry at large to blame its ills on, the real ill being the degree of overcapacity that still exists." □

Chemical output down in West Germany, Switzerland, U.K.

% change from previous year



a 1982 figure is for first six months only. b First-nine-months 1982 figure is not available.
Note: Data exclude synthetic fibers. **Source:** National chemical federations for each country

High costs and stiff competition plague petrochemical producers

JAPAN

Excess capacity and loss of its competitive edge may force a restructuring on Japan's hard-pressed petrochemical industry

Earl V. Anderson, C&EN New York

Japanese imports of ethylene glycol in 1978 accounted for only 6% of domestic supply.

There's a seemingly insignificant statistic if there ever was one. It's insignificant, however, only until coupled with the fact that imported ethylene glycol soared to 27% of total domestic supply during the first half of this year. Then it helps spotlight all the problems that now are plaguing the Japanese petrochemical industry.

The industry, clearly, is having trouble competing with imports. Similar statistics for ethylene dichloride, vinyl chloride, low-density polyethylene, styrene, and a host of other large-volume petrochemicals, mostly ethylene derivatives, confirm this.

Imports of all chemicals are likely to be up almost 10% in 1982, a year in which domestic demand is nothing to brag about. At an estimated $7.1 billion, chemical imports will top chemical exports and give the country its first chemical trade deficit in well over a decade.

In addition to the troubles it has competing with imports at home, Japan's petrochemical industry is having even more trouble competing in export markets, particularly in its traditional and critical markets of Southeast Asia.

In the past, about 20% of Japan's ethylene production was exported, mostly in the form of derivatives. Last year, exports consumed only 12% of Japan's ethylene production.

In part because of the worldwide economic slowdown, but also because its petrochemical industry simply is no longer competitive, Japan's chemical exports will decline 6.5% this year to about $6.4 billion. Although growth rates have been slowing recently, this will mark the first time that chemical exports have actually dropped since the recession years of 1975–76.

The reasons behind this decline are, by now, all too familiar. The industry's lifeblood is naphtha, which is either imported or produced domestically from imported crude oil. Either way, naphtha is expensive feedstock.

As a result, the basic petrochemical building blocks and their derivatives are much more expensive to produce in Japan than they are in areas that are close to natural gas-based feedstocks.

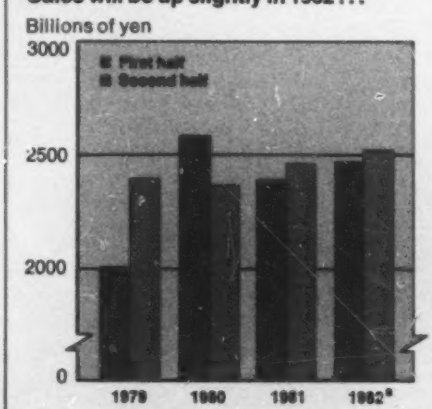
Many of Japan's petrochemical core units also are too old, too small, and too inefficient. And there are too many of them for the size of the market.

Competition is fierce among Japanese petrochemical companies. Their selling prices can't keep pace with rising raw material costs. Profitable companies are few and far between.

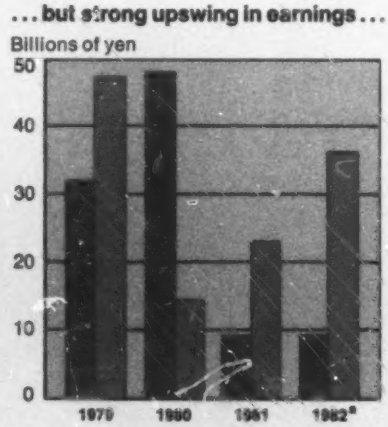
All of this adds up to what the Japanese call a "structurally depressed industry." And the Japanese

Petrochemical producers see some recovery in this year's second half

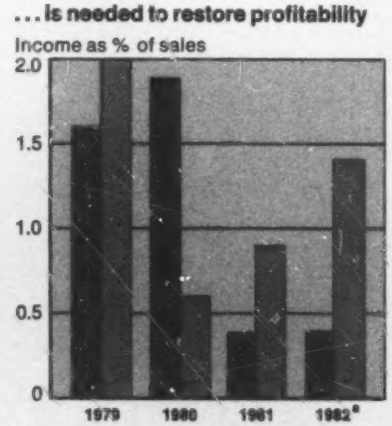
Sales will be up slightly in 1982 . . .



. . . but strong upswing in earnings . . .



. . . is needed to restore profitability



a Estimated. **Note:** Data for fiscal years ending March 31. Based on results of 10 leading Japanese petrochemical companies: Mitsubishi Chemical Industries, Sumitomo Chemical, Asahi Chemical Industry, Toray Industries, Mitsui Toatsu Chemicals, Teijin, Showa Denko, Mitsubishi Petrochemical, Dainippon Ink & Chemicals, and Sekisui Chemical. **Source:** Toyo Keizai Shinposha

are attempting to do something to solve the problem in a typical Japanese fashion.

Earlier this year, Japan's Fair Trade Commission authorized the country's 12 ethylene producers to form an antirecession cartel. The first such cartel in 10 years, it will run for 5.5 months (from Oct. 16, 1982, through the end of March 1983.

The authorization limits ethylene output during that period to 1.56 million metric tons, down 3.6% from the corresponding period a year ago. Average ethylene plant operating rates will be restricted to 56% of capacity, compared to a precartel level of just over 60%.

To put this in perspective, ethylene production during this period will be at a 3.4 million metric ton annual rate. Output in Japan peaked in 1979 at 4.8 million metric tons and has been edging downward ever since. Last year, production was only 3.6 million metric tons and it was down 4% more during the first six months of this year.

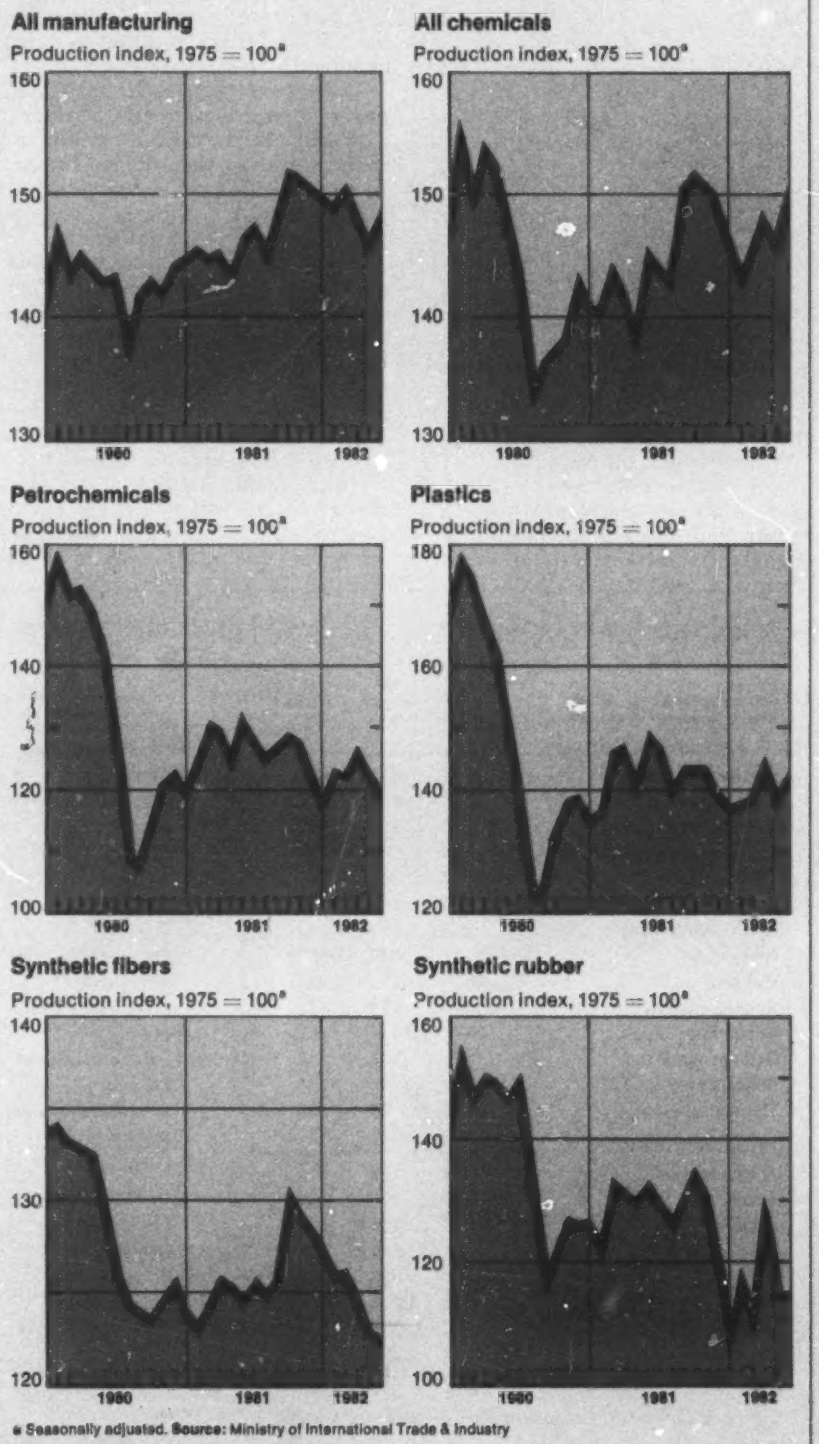
In addition, a petrochemical industry committee of the Industrial Structure Council has urged the Ministry of International Trade & Industry to orchestrate a 35% reduction in ethylene capacity by 1985. Capacity now is rated at 6.2 million metric tons annually. The committee also is suggesting similar cuts in the capacity of many ethylene derivatives.

Its recommendation is based on an estimated 1985 production requirement of 3.7 million metric tons, not much more than last year's level. Supporting this recommendation is the virtual certainty that petrochemical exports will continue to decline and that exports will continue to rise.

At the proposed production rate, petrochemical imports are expected to range between 200,000 and 900,000 metric tons in 1985 and between 900,000 and 1.5 million metric tons in 1990. All of these figures are on a net ethylene basis.

The planned capacity cut would establish 1985 ethylene capacity at 4.1 million metric tons. This implies a 90% operating rate for ethylene pro-

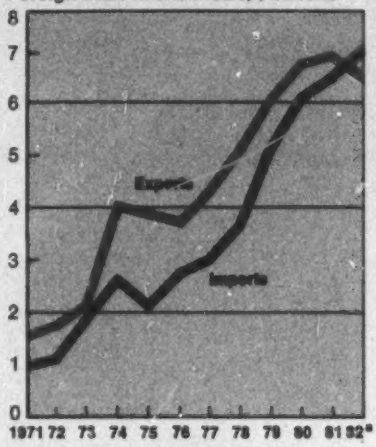
Chemical production remains below 1980 peak



* Seasonally adjusted. **Source:** Ministry of International Trade & Industry

Chemical trade balance slips from surplus to deficit

Foreign trade in chemicals, $ billions



a C&EN estimates. Source: Ministry of International Trade & Industry

ducers and a possible return to respectable profitability.

Meanwhile, plans already are under way to condense the 12 Japanese ethylene producers into four groups to produce and market ethylene and its derivatives. The Mitsubishi group is expected to include Mitsubishi Petrochemical, Mitsubishi Chemical, and Sin-Daikyowa. Mitsui Petrochemical, Nippon Petrochemicals, and Osaka Petrochemical Industries will make up the Mitsui group. Forming the Chiba group will be Sumitomo Chemical, Maruzen Petrochemical, Idemitsu Petrochemical, and Tonen Sekiyukagaku. The last group, as yet unnamed, will list Showa Denke and Sanyo Petrochemical as members.

In fact, throughout the entire Japanese chemical industry, antirecession cartels and joint selling arrangements are the order of the day. In some product areas, companies are joining together to import the very products that they produce.

The rationale is that joint purchasing power will guarantee more attractive import prices under long-term contracts. But it hasn't escaped these companies that they will maintain better control over the production-import mix than they would have if they allowed their customers to do their own importing.

Just how far Japan's chemical industry can or will go toward cartel-type rationalization is difficult to say. Japanese chemical companies are very competitive and are jealous of market share. They may not be able to stay in bed comfortably together. September's ethylene production, for example, shot needlessly up in anticipation of the cartel's arrival in October.

And the Fair Trade Commission, although it has approved many antirecession cartels, opposes the idea of government doing all that it can to save structurally depressed industries. It contends that, by artificially sustaining weak industries, the country is wasting economic muscle that could be used more effectively elsewhere. It also believes that the cartels invite criticism, if not retaliation, by Japan's foreign trade partners.

However, the commission will have to lock horns with the powerful Ministry of International Trade & Industry. And there's no doubt that the petrochemical industry needs some form of help.

One study concludes that the industry will have to push profits up from a negative 5% of sales to a positive 10% to maintain its health. "The natural approach," says the study, "would be rationalization . . . within a reasonable period of time." □

Volume is lower for most major chemical products this year

Thousands of metric tons unless otherwise indicated	1981	Six months 1982	Six months 1981	% change
INORGANIC CHEMICALS				
Ammonium chloride	584	245	302	−19%
Ammonium sulfate	1815	855	915	−7
Calcium carbide	495	267	267	0
Calcium superphosphate	483	284	254	12
Carbon black	557	255	280	−9
Chlorine, liquid	764	408	381	7
Hydrochloric acid	565	283	289	−2
Nitrogen[a]	5147	2633	2550	3
Oxygen[a]	6603	3331	3231	3
Sodium carbonate	1175	574	607	−5
Sodium hydroxide	2871	1410	1432	−2
Sodium silicate	692	323	357	−10
Sulfuric acid	6572	3246	3274	−1
Titanium dioxide	176	93	90	3
ORGANIC CHEMICALS				
Acetaldehyde	324	146	164	−11
Acetic acid	365	177	179	−1
Acetone	225	114	110	4
Acrylonitrile	477	241	235	3
Benzene	1899	899	949	−5
Butadiene	518	256	258	−1
Butanol	237	108	113	−4
Caprolactam	427	200	216	−7
Cyclohexane	475	213	226	−6
Dioctyl phthalate	223	106	112	−5
Ethylene	3647	1792	1869	−4
Ethylene dichloride	1650	744	875	−15
Ethylene glycol	411	181	182	−1
Ethylene oxide	478	228	220	4
Methanol	734	353	380	−7
Octanol	239	102	110	−7
Phenol	214	101	111	−9
Phthalic anhydride	254	132	124	6
Propylene	2536	1237	1230	1
Propylene glycol	171	91	81	12
Styrene	1095	515	538	−4
Terephthalic acid	635	317	307	3
Toluene	821	406	420	−3
Toluene isocyanate	64	29	27	7
Xylene	1262	596	579	3
Urea	1483	632	804	−21
PLASTICS				
Phenolic resins	294	140	144	−3
Polyethylene	1871	840	883	−5
Polypropylene	959	462	482	−4
Polystyrene	1183	582	566	3
Polyvinyl chloride	1129	560	598	−6
SYNTHETIC RUBBER	1010	455	506	−10

a Millions of cubic meters. Source: Ministry of International Trade & Industry

Chemical companies seek relief from the burden of feedstock costs

CANADA

Export sales are down this year as high cost of oil makes Canadian chemicals less competitive in world markets

Earl V. Anderson, C&EN New York

Until very recently, Canadian petrochemical executives were talking enthusiastically about a "window of opportunity." Today, however, they are talking about a "window of survival."

Blessed with ample supplies of oil and natural gas that would be maintained below world price levels by government decree, Canada's chemical companies launched a program of massive, world-scale plant building that would serve not only the domestic Canadian market, but the world market as well. By moving fast, Canada's petrochemical industry figured it could rush through its window of opportunity before potential competitors, such as Mexico and Saudi Arabia, could make an impact on the international marketplace.

At the time, the scenario made sense. But Canadian petrochemical producers didn't reckon with two developments that struck them simultaneously and now put that scenario in jeopardy.

Like the chemical industries in many other countries, Canadian producers have had to cope with a recession-weakened market, both at home and abroad. But unlike the industries in other countries, particularly the U.S., they have had to contend with a government energy pricing policy that pushed up the costs of feedstock at a time when such costs were dropping in other parts of the world.

The consequences are not surprising. Production is down. Plant operating rates are low. Profits, caught in a classic cost-price squeeze, have evaporated. Because of cash flow problems and budget restraints, companies are delaying some plant construction plans and canceling others. Meanwhile, the Canadian petrochemical industry is pressuring its government to lighten the feedstock cost burden.

This year's slump in production hit the Canadian chemical industry across the board. Basic petrochemicals, intermediates, plastics, industrial inorganic chemicals, and fertilizer all suffered.

Output of ethylene—cornerstone of the Canadian petrochemical industry—will be down about 27% this year, and consequently so will much of the industry's expansion plans. Alberta Gas Ethylene's unit at Red Deer, Alta., shut down in July. Oil-based producers in Sarnia, Ont., and Montreal, Que., extended scheduled downtimes because of weak demand. Operating rates in all areas are low.

On the aromatics side, benzene production will be 15% less than it was last year. Plastics haven't fared much better. Output of polyethylene, polyvinyl chloride, and polystyrene all are off about 10%.

Chlor-alkali producers are faring better than most. Chlorine output probably will be down only 2.5%, and caustic production will be 4% lower. But that's only because Canadian producers have a substantial market in the U.S. Sulfuric acid output, on the other hand, will decline about 20% this year.

Competitive natural gas costs have enabled Canadian ammonia producers to maintain fairly healthy markets. Production of ammonia probably will be off only about 3% this year, again because Canadian producers get a big share of their business from customers in the U.S.

Were it not for exports, in fact, the entire Canadian chemical industry would be in worse shape than it is. Exports are an important part of the chemical picture in Canada; they have more than quadrupled since 1975.

This year, however, even export sales are down—about 9% from last

Production plummets for just about all leading chemicals

Thousands of metric tons	1982[a]	1981	1980	1979	1978
Ammonia	2570	2654	2555	2405	2398
Ammonium nitrate	790	911	873	914	871
Ammonium phosphate	915	1355	1466	1336	1178
Benzene	480	566	604	492	555
Chlorine	1260	1292	1303	1031	941
Ethylene	980	1330	1184	1014	826
Hydrochloric acid, 100%	135	186	177	154	155
Phosphoric acid, 100% P_2O_5	535	744	808	748	554
Polyethylene	610	674	641	628	478
Polystyrene	135	123	110	124	99
Polyvinyl chloride	200	222	190	145	125
Sodium chlorate	250	254	245	224	199
Sodium hydroxide	1400	1458	1459	1138	1036
Sulfuric acid	3325	4117	4295	3666	3261
Urea	1220	1303	1274	1212	1217

a C&EN estimates. Source: Statistics Canada

year's record $4.6 billion (Canadian) to $4.2 billion. However, Canadian chemical companies were able to maintain those export sales only by shaving their prices and sacrificing profits.

Weak Canadian markets also have forced chemical imports down this year. They are likely to end the year off about 4% at $3.7 billion as a result, enabling the industry to chalk up a $530 million surplus in chemical trade. It will be the fourth successive surplus in Canada's trade balance for chemicals, after years of deficits.

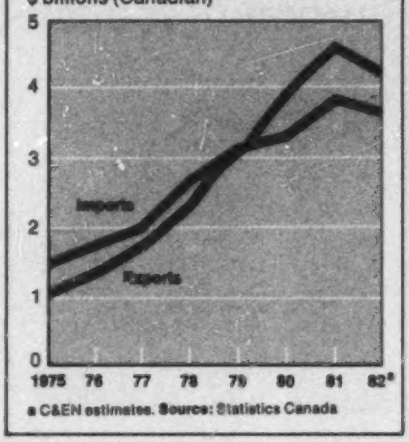
Weak foreign sales at little or no profit, even weaker domestic sales, and rapidly rising feedstock costs all are combining to splatter chemical companies' income statements with red ink.

For instance, the combined nine-month sales of five large Canadian chemical companies (C-I-L, Celanese Canada, DuPont Canada, Polysar, and Union Carbide Canada) fell 9% this year compared to the same period last year. More important, net income was down a whopping 28%.

With the exception of C-I-L, all these companies have been losing money on their operations this year. And even C-I-L's profits are down more than 60%.

The combined quarterly earnings of these companies have been less than those in the corresponding quarter of the preceding year for eight successive quarters now. But the big blow came in this year's third quarter. The combined loss hit a staggering $24.1 million in that three-month period alone.

Chemical trade declines but surplus continues



Late in the third quarter and early in the fourth quarter, there were a few scattered signs of an improvement in Canadian chemical production. But these improvements certainly do not indicate a general, across-the-board recovery.

Even if the forecasters are right about a mild pickup in the Canadian economy and an upturn in chemical markets through the world during the next 12 months, the Canadian chemical industry still will not be solidly back on its feet. Realizing this, many Canadian chemical companies are petitioning the government to give them some relief from increasingly high and burdensome feedstock costs.

Companies in the oil-based petrochemical centers of Sarnia and Montreal are particularly hard-pressed. Among other forms of relief, they want Ottawa to exempt oil that is upgraded into petrochemicals from the petroleum compensation charge and the Canadian ownership charge. Both are up-front taxes that are written into Canada's energy pricing policies.

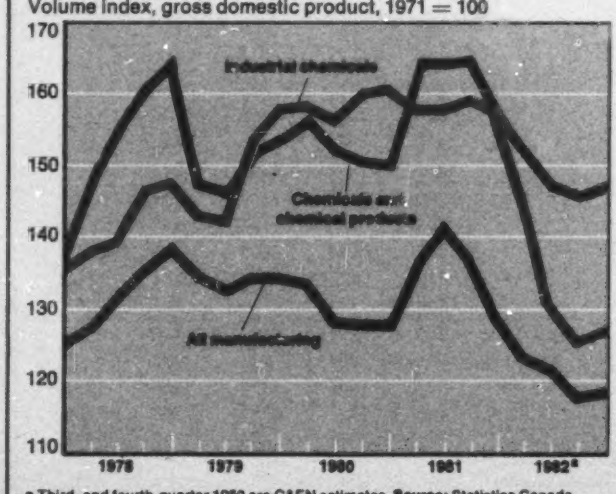
The compensation charge is the focal point. Currently, this charge, which subsidizes the cost of imported oil and domestic synthetic oil production, is $6.30 per barrel. It is scheduled to drop to $3.30 per bbl on Jan. 1, but, at the same time, the wellhead price of oil will increase $4.00.

Whether they get this relief, or any relief at all, may become known soon. Government agencies studying the problems of the Canadian petrochemical industry have just completed a task force report. The report is circulating now among the ministries and hasn't been released yet publicly.

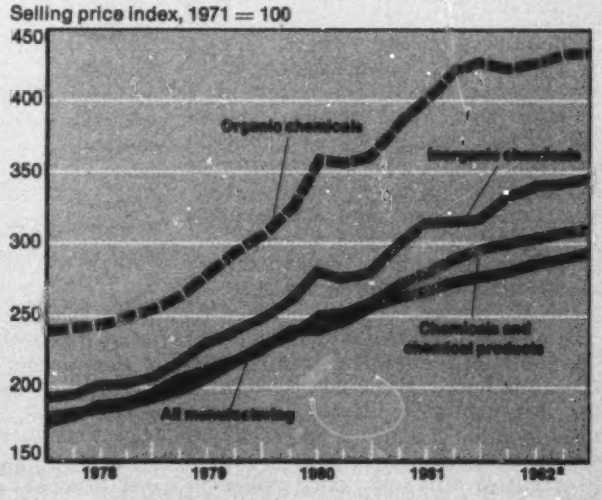
No one in the industry openly admits to having seen the report. But there are hints that it casts doubts on the costly subsidies that may be required to sustain the Petrosar and Petromont core petrochemical complexes in Sarnia and Montreal, respectively.

Whatever else the report may contain, it certainly will not provide any easy solutions to the knotty economic problems that now are facing Canada's beleaguered petrochemical industry. □

Chemical output is off sharply . . .

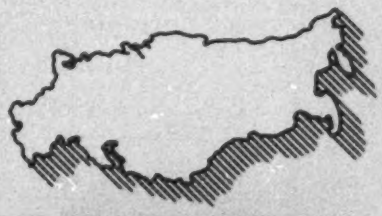


. . . and prices are climbing more slowly



a Third- and fourth-quarter 1982 are C&EN estimates. Source: Statistics Canada

Slow growth, basic problems beset U.S.S.R., East Europe



U.S.S.R./ EASTERN EUROPE

Authorities unlikely to make major changes in economic system to solve problems of chemical and other industries

Richard J. Seltzer, C&EN Washington

These are not ordinary times for the Soviet Union and its six eastern European fellow members of the Council for Mutual Economic Assistance (CMEA)—Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania. The U.S.S.R. stands at a major turning point in its history, some western specialists say, comparable to the post-Lenin and post-Stalin periods.

The death of President Leonid Brezhnev leaves behind a whole agenda of unresolved problems and issues—many of them in the economic and industrial sphere.

By many accounts, the choice of Yuri Andropov to succeed Brezhnev was motivated by the desire for a strong leader and manager to get the country—particularly its economy and industry—moving again. In fact, Andropov began his service as head of the Communist Party with a speech to its Central Committee frankly acknowledging Soviet economic problems and calling for action to correct them. Measures to fight corruption and increase worker discipline are expected, for example. And Moscow, of course, sets the pattern for the region.

Information is sparse about Soviet and eastern European economic results this year and goals for next year (one western analyst comments that the worse the results, the less data the Soviets seem to publish). However, the Soviet and eastern European economies and industries generally are continuing the slower growth that began in 1979. The current five-year plans (1981–85) set generally modest growth targets, and even many of these are not being met. This slowdown, which includes reductions in capital investment and in imports of technology and plants, reflects the bloc's economic problems and concern to reduce its foreign debt.

Thus, real gross national product for the six eastern European CMEA members actually declined in 1980 and 1981 (down 0.6% and 0.9%, respectively). Soviet GNP grew only 0.8% in 1979, 1.2% in 1980, and 1.8% in 1981, according to Central Intelligence Agency figures. (CIA growth estimates are generally lower than official national figures, because the agency tries to eliminate upward bias caused by double counting and disguised inflation.)

Similarly, industrial production for the six CMEA members dropped 2.0% in 1981, according to CIA estimates (the target was a 3.9% gain). The average was weighed down by a 14.8% plummet in Poland's output. (The other five nations increased their output 1.4 to 3.2%, all falling at least 40% short of target.) The six-nation goal for 1982 is only a 2.8% rise, but this is also unlikely to be met.

Moreover, the U.S.S.R.'s industrial output rose only 2.0% in 1981, CIA figures show, just half the goal of 4.1%. This year, Soviet output is growing at a slightly higher rate—up 2.7% through October compared to the same period last year, according to official figures (CIA calculations would yield a lower rate). However, this growth rate still falls well short of the target (4.7%). And the goal set for next year is a low 3.2%, well below the growth needed to meet the five-year plan's goal of an average increase of 4.7% per year in 1981–85. Thus, it appears that not yet halfway through the five-year plan, the Soviets already are abandoning even its supposedly moderate and realistic goals.

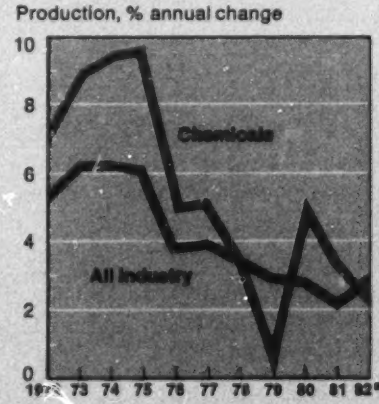
The chemical industry generally has received high priority in Soviet and eastern European development. It was among the fastest growing industries between 1976 and 1980. It also is slated to grow faster than industry as a whole in most of the region's countries between 1981 and 1985, particularly in Romania (an average annual growth rate of 10.2%, compared to 7.6% for all industry), Bulgaria (7.7% for the chemical industry and 5.1% for all industry), and the U.S.S.R. (5.7% for the chemical industry and 4.7% for all industry).

A general tendency is to increase production of plastics to substitute for metals. High growth rates also are set for synthetic fibers, pharmaceuticals, cosmetics, and other consumer products. Romania, for instance, aims to double production of synthetic rubber, plastics, tires, and pharmaceuticals between 1980 and 1985, and to increase fertilizer production 65%. The Soviet Union plans to raise output of plastics 68% between 1980 and 1985 (to 6.1 million metric tons), synthetic fibers and yarns 36%, and pesticides 40%.

However, many of the region's chemical goals appear overoptimistic. Expansion will be restricted in several

Soviet production growth has slowed since 1976

Production, % annual change



a For 10 months, based on official Soviet statistics. **Note:** All figures except for 1982 are based on Central Intelligence Agency estimates, giving lower results than official Soviet statistics because of postulated upward bias in Soviet figures. **Sources:** Central Intelligence Agency, U.S. Department of Commerce

Soviet chemical output grows more slowly than in 1981

Thousands of metric tons, unless otherwise noted	10 months 1982[a]	1981	1980
Mineral fertilizers[b]	22,300	26,000	24,760
% change[c]	2%[d]	5.0%	11.8%
Nitrogen (N)	na	10,900	10,241
% change[c]	na	6.4%	11.9%
Phosphate (P_2O_5)[e]	na	6,700	6,455
% change[c]	na	3.8%	1.7%
Potassium (K_2O)	na	8,400	8,064
% change[c]	na	4.2%	21.5%
Sulfuric acid, 100%	19,700	24,100	23,033
% change[c]	−1%[d]	4.6%	3.0%
Synthetic ammonia[f]	na	14,650	13,762
% change[c]	na	6.5%	12.1%
Plastics[g]	3,400	4,090	3,636
% change[c]	−0.4%[d]	12.5%	4.5%
Sodium hydroxide, 100%	na	2,757	2,755
% change[c]	na	0.1%	2.8%
Synthetic rubber	na	1,860	1,880
% change[c]	na	−1.1%	0.7%
Chemical fibers and yarns	1,034	1,207	1,200
% change[c]	2.0%[d]	0.6%	8.0%
Pesticides and herbicides	442	504	470
% change[c]	6.0%[d]	7.2%	−1.1%

a Approximate figures. b Nutrient content basis; including some products used for technical purposes. c Increase or decrease from result in previous year. d Increase or decrease from 10-month result in previous year. e Including production of ground phosphate rock for direct application and phosphate animal feeds. f Nitrogen content. g Including resins for man-made fibers. na = not available. Sources: Central Intelligence Agency, Department of Commerce, Textile Economics Bureau

Drop in Poland's chemical output makes a generally poor year for East Europe even worse

Thousands of metric tons in 1981	Bulgaria	Czecho-slovakia	East Germany	Hungary	Poland	Romania
Mineral fertilizers[a]	na	1085	4787	893	2242	2640
Change from 1980	na	−8.2%	1.1%	4.7%	0.2%	7.7%
Nitrogen (N)	753	539	967	589	1274	na
Change from 1980	3.2%	−12.8%	2.5%	5.4%	−1.2%	na
Phosphate (P_2O_5)	258	340[b]	360[b]	158	866	na
Change from 1980	18.9%	−5.8%	−2.7%	6.0%	2.7%	na
Potassium (K_2O)	—	206[c]	3460	146[c]	103[c]	na
Change from 1980	—	1.5%	1.1%	0.7%	−1.9%	na
Sulfuric acid, 100%	920	1318	na	600[d]	2776	na
Change from 1980	8.0%	2.6%	na	−2.3%	−8.0%	na
Synthetic ammonia[a]	1023	na	na	na	1465	na
Change from 1980	1.4%	na	na	na	−1.2%	na
Plastics	284	913	998	311	475	580
Change from 1980	11.8%	2.1%	15.9%	−5.2%	−1.35%	0.2%
Sodium hydroxide, 100%	157	331	631	180	400	na
Change from 1980	−2.5%	1.5%	0.8%	−4.3%	−3.6%	na
Synthetic rubber	30	60	175	—	111	146
Change from 1980	0%	0%	2.9%	—	−5.9%	−2.7%
Chemical fibers and yarns	88	135	307	29	182	203
Change from 1980	2.3%	2.9%	−0.1%	0.7%	−27.1%	1.6%

a Nutrient content basis. b Including production of ground phosphate rock for direct application and phosphate animal feeds. c Imported potash added to domestically produced nitrogen and phosphate to form multinutrient fertilizer. d Including oleum. na = not available. Sources: Central Intelligence Agency, Textile Economics Bureau

countries by limits on oil imports. Indeed, chemical production generally has been growing at a slower rate for several years and has been failing to achieve targets. Chemical and rubber output in Hungary, for example, rose only 2.0% in 1981 (the target was 4.0%) and actually dropped 2.1% in 1980. This compares with increases of 6.1% in 1979 and 10.7% in 1978. Czech chemical production rose only 0.1% in 1981, curtailed by reduced imports of oil and other raw materials. Bulgaria is an exception, racking up an 11% expansion in 1981, exactly meeting its target.

The Soviet Union raised chemical production only 3.5% last year (the goal was 5.0%), according to CIA figures. This represents a decline from growth rates of 5.2% in 1980 and 7 to 10% a year from 1971 to 1975. This year, Soviet output is slowing even more, with production through October up just 2% from the same period last year, according to official figures.

Soviet mineral fertilizer production, for example, was up only 2% through October, compared with the same period last year, whereas production grew 5% in 1981 and 12% in 1980. Output through October of sulfuric acid and plastics was actually less than in 1981 (down 1% and 0.4%, respectively). The plastics results must particularly disappoint the Soviets, because plastics are a high-priority area—output, which grew 12.5% in 1981, is supposed to rise an average 11% a year through 1985.

Chemical industry development is obstructed by many of the factors that hinder industrial development in general in the Soviet bloc—low labor and capital productivity; poor product quality; shortages of labor, energy, and raw materials; construction and transportation bottlenecks; wasteful use of resources; inefficient management; corruption; disincentives to innovate; and outmoded technology and equipment.

What will the Soviets and Eastern Europeans do about all these problems? Many western economists say the problems are rooted in the central planning system, and believe only fundamental changes in the system can solve the problems. Speculation is rife about whether Andropov will initiate changes comparable to Hungary's introduction of a measure of decentralization and market incentives. However, major changes are unlikely because they would mean a loss of political control. More likely, the region's economies will continue to limp and muddle along. □

Saudi Arabia set to emerge as factor in world marketplace for chemicals

MIDDLE EAST

First of current generation of chemical plants is expected to be on stream next year

Dermot A. O'Sullivan, C&EN London
Richard J. Seltzer, C&EN Washington

Next year marks the scheduled startup of two petrochemical operations in Saudi Arabia. Some of the methanol and urea produced will find its way into world markets.

The event will be significant on at least two counts. That the units will be ready on time is a rebuttal to those who have been skeptical that sophisticated chemical engineering projects could be built in the harsh environment of the Middle East. And it signals completion of the first of a series of projects that Saudi Basic Industries Corp. (SABIC) expects to have running before the end of 1986.

Methanol will be produced by Saudi Methanol Co. (Ar-Razi), a joint venture between SABIC and a Japanese consortium. The plant has a capacity of 1.32 billion lb a year. Urea will be made by Al-Jubail Fertilizer Co. (Samad), in which SABIC and Taiwan Fertilizer Co. are partners. This plant will have an annual capacity of 1.1 billion lb. Both the methanol and urea plants are located at Al-Jubail, the new industrial port city on Saudi Arabia's east coast, and will operate on methane derived from local natural gas.

Dow Chemical made a surprise move earlier this month when it elected to withdraw from its joint partnership with SABIC in Al-Jubail's Arabian Petrochemical Co., Petrokemya. Termination cost Dow $26 million. SABIC, meanwhile, will proceed, presumably alone, with the project, the key element of which will be an ethane cracker with an annual ethylene capacity of 1.1 billion lb. Some of the ethylene will go to a 231 million lb-per-year high-density polyethylene unit. However, Petrokemya will scratch plans for a 165 million lb linear low-density polyethylene plant. The Petrokemya cracker also will supply neighboring Eastern Petrochemical Co. with ethylene for conversion to ethylene glycol and conventional low-density polyethylene in a joint undertaking between SABIC and a group of Japanese companies.

SABIC's planners already have their sights set on the next generation of plants. According to Abdulaziz Alzamil, the state-owned company's managing director, there will be a vinyl chloride/polyvinyl chloride operation with a capacity of either 220 million or 440 million lb per year and a methyl *tert*-butyl ether plant of up to 1.1 billion lb capacity. And a 66 million lb-a-year polystyrene plant "is under active consideration." All three could be on stream by 1988.

About 11% of the output of the various units will go to local Saudi Arabian industry. A further 25% or so will be used captively by SABIC's partners. The balance will be sold on the open market. Alzamil acknowledges that such sales "will affect markets in various areas of the world, even though Saudi petrochemicals represent only 3 to 5% of world capacity." However, he insists that: "We have the right to ask that our industrial products be accorded the same liberal and unhindered treatment that we are according the products of industrialized countries. We will not accept that our products be treated unfairly, or that any obstacles be put against them."

Elsewhere in the Middle East, Egyptian Petrochemical Co. is moving ahead rapidly with its plans for a petrochemical complex at Alexandria. Japan's Toyo Engineering and Technipetrol of Italy won contracts to install a vinyl chloride/polyvinyl chloride facility with a polymer capacity of 176 million lb annually. Enquiries now have gone to contractors for engineering the associated 132 million-lb chlorine unit. Completion is targeted for 1985. Eventually, a cracker will be built on the site with an initial annual ethylene capacity of 440 million lb, which might be expanded to 660 million lb, for making HDPE and linear LDPE (220 million lb), and conventional LDPE (132 million lb).

And in Israel, this year and last have been mixed years for the economy. The economy has revived from slower growth, with gross national product up about 4.5% in 1982 compared to 2.3% in 1980. The inflation rate is rising, however, and the balance of payments deficit also is increasing as a result of slackening demand for Israeli products in recession-ridden European and U.S. markets.

Despite these setbacks, Israel continues its ambitious 10-year plan for expansion of high-technology industries, viewing their high-value-added exports as the route to long-term resolution of its economic plight. Exports based on local R&D account for about a third of all industrial exports now and are to rise to half or more by 1990. Industrial exports in general (excluding diamonds) are to rise 12% a year, to $11.3 billion, by 1991. About $1 billion a year of investment will be required.

Israel's chemical industry is to raise output 8% a year and exports 10% a year through 1990. The industry accounts for almost a third of both industrial production and industrial exports—exporting about $1.1 billion last year and probably the same this year. Under the 10-year plan, $3.5 billion is to be invested in chemical development by 1990. □

Chemical expansion stalls under moves to cure Mexico's ills

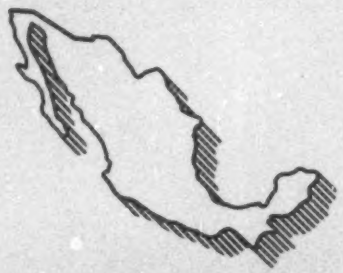
When an industry that had been expanding as fast as Mexico's chemical industry has the rug pulled out from under it, the ensuing fall can be devastating.

The chemical industry in that hydrocarbon-rich country had, indeed, been growing fast. Between 1975 and 1981, output of basic petrochemicals, by law the sole domain of the state-owned oil company, Petroleos Mexicanos (Pemex), had risen an average 16.5% per year.

Value of total chemical production in Mexico increased more than fourfold. Even allowing for the peso's dollar value being cut in half during that time, Mexico's chemical industry has enjoyed enviable growth.

Private investment, both domestic and foreign, poured into Mexico's secondary chemical sector. Meanwhile, Pemex embarked on a massive plant-building program that figured to reduce dramatically the country's heavy dependence on imported chemicals.

Now, however, the economic rug has been pulled out from under Mexico's high-flying chemical industry. And as a result, for most chemical companies, the game plan—at least for the short term—has switched from growth to sheer survival.



MEXICO

Government measures to overcome an economic crisis have crimped chemical output and investment plans

Earl V. Anderson, C&EN New York

Much will depend upon the policies implemented by Miguel de la Madrid Hurtado, who was sworn in earlier this month for a six-year term as Mexico's new president. In his inaugural address, de la Madrid said that he soon would embark on a program of tough austerity measures to deal with Mexico's worst economic crisis in 40 years.

If he does, the chemical industry—indeed, all of Mexico's industry—is in for at least one lean year, probably more. If he doesn't, the economic outlook could be even more bleak.

De la Madrid takes over a country whose economy, until this year, was the envy of the world. But growth depended upon revenues from Mexico's huge oil reserves, and the bottom has fallen out of the world oil market Mexico's foreign debt soared to $80 billion. The country now finds itself with little foreign exchange to pay the interest, much less the principal, on that debt.

Two devaluations this year shrunk the value of the peso from about 25 to the U.S. dollar to an official 70 to the dollar. Unofficially, the exchange rate is above 100 to the dollar. Inflation in Mexico is running about 100% annually. Unemployment is high and will go higher, even without necessary government austerity measures. Former president Jose Lopez Portillo imposed tight controls on foreign exchange that make it difficult, if not impossible, to get critical imports. The banks throughout the country have been nationalized.

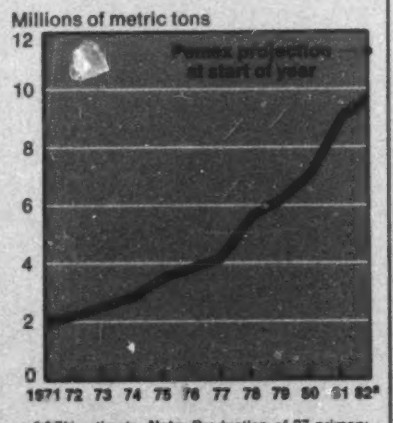
Under these circumstances, it isn't surprising that Mexico's chemical industry is struggling. Chemical output was up through the first half of the year, but has dipped badly since August. Pemex, which had expected to produce about 11.4 million metric tons of basic petrochemicals this year (a 24% increase), probably will make only 9.9 million tons, about 87% of the target.

A spokesman for a U.S. company with a subsidiary in Mexico says that by July that subsidiary had reached 80% of its 1982 sales goal. Now, he doubts that the subsidiary can even reach its goal.

Pemex has delayed some of its ambitious expansion plans for petrochemicals. Others may be canceled completely. Private companies in the secondary chemical industry also have put many of their expansion plans on hold.

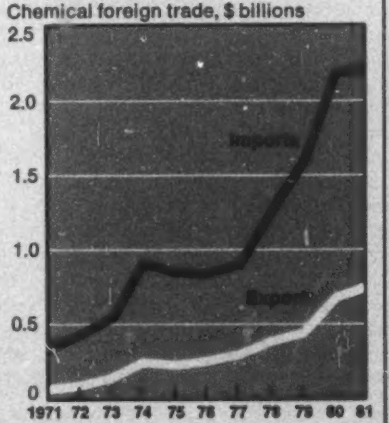
The entire Mexican chemical industry, in fact, will be on hold until de la Madrid can put Mexico's economic house back in order. □

Petrochemical output falls short of target this year



a C&EN estimate. **Note:** Production of 37 primary petrochemicals produced exclusively by Petroleos Mexicanos (Pemex). **Source:** Pemex

Chemical trade deficit nears $1.5 billion



Source: Asociación Nacional de la Industria Química (ANIQ)

Demand for chemicals stagnates but import curbs and exports boost output

BRAZIL

With new capacity coming on stream, Brazil's chemical industry will have to strive even more to build foreign sales

Earl V. Anderson, C&EN New York

The Brazilian chemical industry, like its counterpart in Mexico, is a victim of its country's broader economic plight. In Mexico, however, the necessarily harsh economic moves dictated by a huge foreign debt came suddenly, painfully, and only recently.

Brazil also is saddled with a huge foreign debt, estimated variously from $72 billion to $90 billion. But in Brazil the government has been making all of the proper moves for the past two years to cope with its external financial problems.

Anticipating the impact of the recession and high interest rates throughout the world, Brazil freed interest rates and cut its budget deficit. It also set in motion small and frequent devaluations of the cruzeiro to keep its industries competitive.

The impact was inevitable. After chalking up several successive years of impressive growth, Brazil's real gross domestic product fell 2% last year. It certainly won't improve this year, or next year either.

Most Brazilian chemical executives suspected early last year that the industry's short-term outlook wasn't too bright. Events have borne them out.

Chemical and petrochemical sales dropped last year 7.8%, after recording an 18.7% surge in 1980. Average industry profit margins (as a per cent of sales) dipped to 4.5%, compared to 6.4% a year earlier.

More of the same is in store for the Brazilian chemical industry this year and next. First-half production statistics compiled by Abiquim (Associacão Brasileira da Industria Quimica e de Produtos Derivados) indicate that output of many chemicals is way ahead of last year. Notable exceptions are caustic, chlorine, and low-density polyethylene.

These statistics, however, can be misleading. They do not reflect a strong domestic market for chemicals in Brazil. Instead, they are industry's response to the government's determined effort to improve Brazil's balance of trade by restricting imports and promoting exports.

According to one Brazilian chemical executive, chemical demand in Brazil will be flat to down 10% in 1982. Market growth in 1983 will be zero, he adds.

Certainly, exports coupled with the substitution of domestic output for imports will be major factors in any production increases in 1983. A few months ago, the government added another wide list of chemicals that cannot be imported. That and recent official statements indicate that import restrictions will be even more severe next year.

Brazilian chemical exports jumped last year to about $400 million from $148 million in 1980. First-half statistics indicate that chemical exports will be about the same in 1982. However, many companies have had to sacrifice profits to move these products out of Brazil and into highly competitive world markets.

One thing is certain. Brazil will have more chemicals to export in 1983. Domestic demand will remain stagnant. Meanwhile, the country's newest petrochemical complex at Rio Grande do Sul will be producing more—and currently unneeded—chemicals. □

Output rising for most chemicals

Thousands of metric tons	First six months 1982	First six months 1981	% change	Annual capacity
INORGANIC CHEMICALS				
Ammonia	492	216	127%	962
Chlorine	242	308	−22	762
Sodium hydroxide	374	396	−5	876
Sulfuric acid	1174	1022	15	3242
ORGANIC CHEMICALS				
Benzene	168	168	0	326
Ethylene[a]	386	369	5	776
Ethylene oxide	63	44	44	140
Formaldehyde	76	69	11	292
Methanol	55	55	0	158
Propylene	226	222	2	574
Styrene	98	86	14	230
Toluene	69	60	14	122
Urea	151	133	13	841
Vinyl chloride	138	109	26	290
Xylene	48	43	13	80
PLASTICS				
Polyethylene, high density	67	58	15	120
Polyethylene, low density	167	170	−1	312
Polypropylene	74	56	32	100
Polystyrene	55	38	46	180
Polyvinyl chloride	141	136	4	375

a Petrochemical only. Source: Associacão Brasileira da Industria Quimica e de Produtos Derivados